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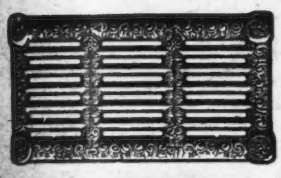

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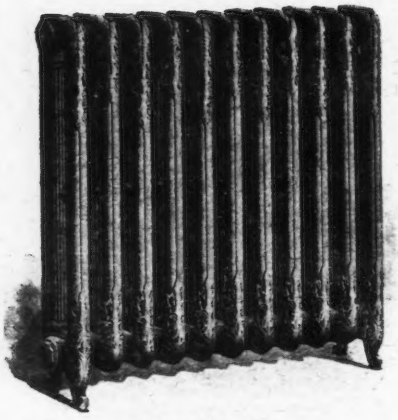

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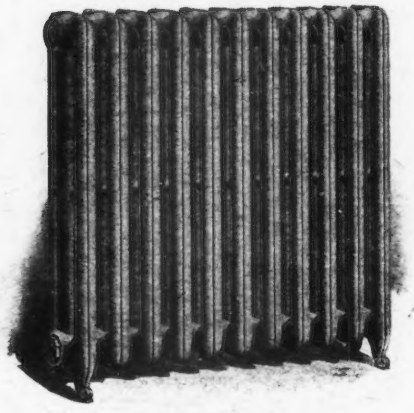

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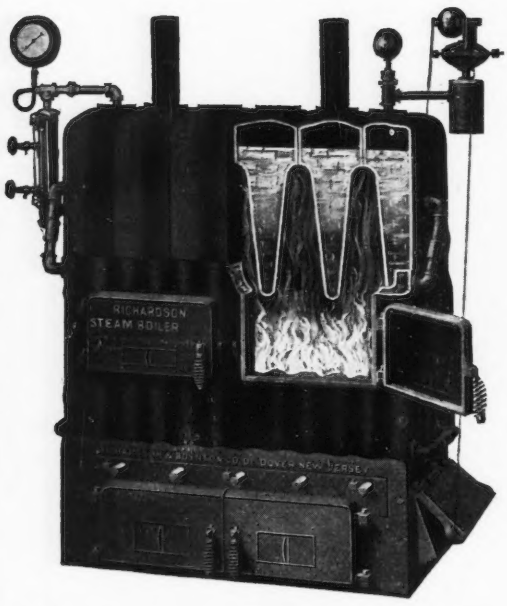


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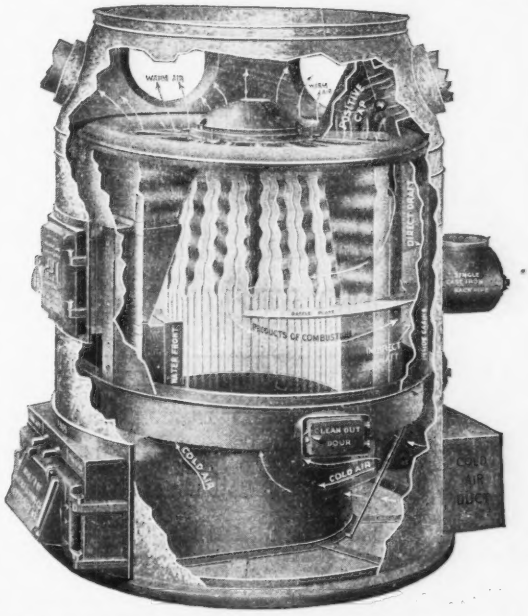
These Heat Tubes are so arranged in each Generator that they surround the fire and form the **Fire Cylinder and Combustion Chamber.**

Each Heat Tube weighs about 70 lbs. and has eight square feet of heating surfaces, and there are from eight to sixteen tubes in each Generator, according to its size and capacity.

Surrounding the Heat Tubes, and four inches removed from their backs, is the "Inside Casing," and surrounding the Inside Casing, with three inches of space between, is the outer or Galvanized Iron Casing. The space between the backs of the heat tubes and the Inside Casing forms the draft chamber, and the "products of combustion" pass out of openings between the flues at the top of the combustion chamber, into the draft chamber and thence down around the "baffle-plate" and back again to the "indirect draft" opening.




The Heat Tubes give the Kelsey in the medium size Generator (No. 21 with 21 inch grate) an average of 61 square feet of heating surfaces to each square foot of grate surface, or more than double that of the ordinary furnace.

The air passing through the Zig-Zag Heat Tubes is thoroughly mixed and evenly warmed.

With any fire the Tubes must be heated, and the air passing through is warmed.

The Heat Tubes are heated by conduction, and, unlike the ordinary furnace, when the fire is banked for the night, warm air continues to flow into the rooms, and the house is warm in the morning if so required.

The great weight of the Heat Tubes means that they are not quickly subject to heat fluctuations, and with any ordinary attention to the fire an even, uniform temperature is easily maintained throughout the house.

The warm air currents are carried **to the top of the Generator,** and are **forced** out through the nearest heat conducting pipes.

Each Heat Tube is an independent heater in itself, and by capping over two or more of the tubes with the Kelsey Patented "Positive Cap Attachment," the warm air coming through these particular Tubes is forced through the heat conducting pipe to any room which may be exposed or distantly located.

The Zig-Zag Heat Tubes make the Kelsey the only heater that is properly designed to heat air travelling at a high velocity, as in the Mechanical System when forced by a fan or blower.

One No. 30 Kelsey Generator has by actual test, verified by uninterested parties, heated 4500 cubic feet of air per minute through 130° temperature with fan pressure. The efficiency test showed the high average of 85.7%.

The Kelsey method of warming air, the great heating surfaces of the Kelsey, the utilization of all the heat, and the capacity for warming large volumes of air properly and forcing to every part of a building, are the main reasons why the Kelsey Warm Air Generator has earned a reputation for efficient, economical and healthful heating.

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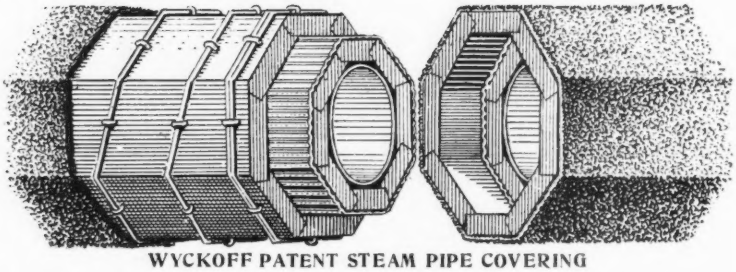

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VOL. V No. 12

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**SEE SWEET'S INDEX**

# THE HEATING AND VENTILATING MAGAZINE

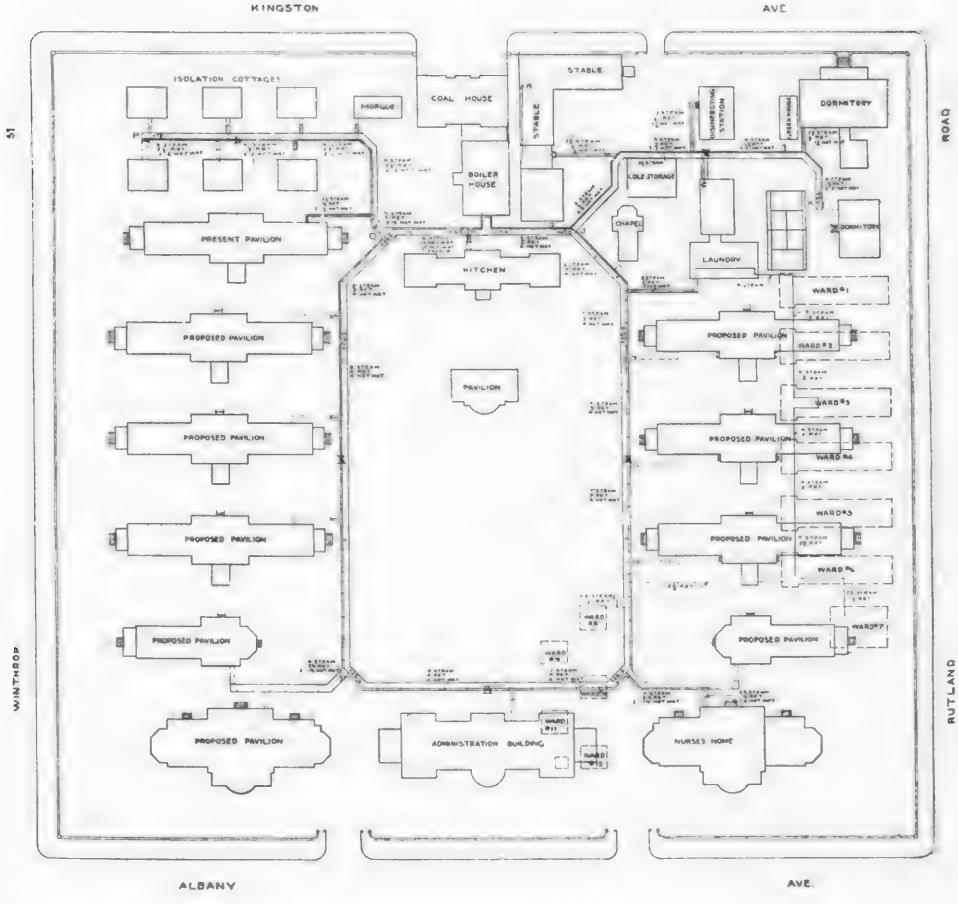
1123 BROADWAY NEW YORK DECEMBER, 1908


## *SOME INTERESTING PIPE TUNNEL WORK*

### *The Kingston Avenue Hospital*

### *Brooklyn, N. Y.*

William J. Baldwin, Engineer




GROUND PLAN OF KINGSTON AVENUE HOSPITAL, BROOKLN, NEW YORK
SHOWING DESIGN OF UNDERGROUND PIPING SYSTEM

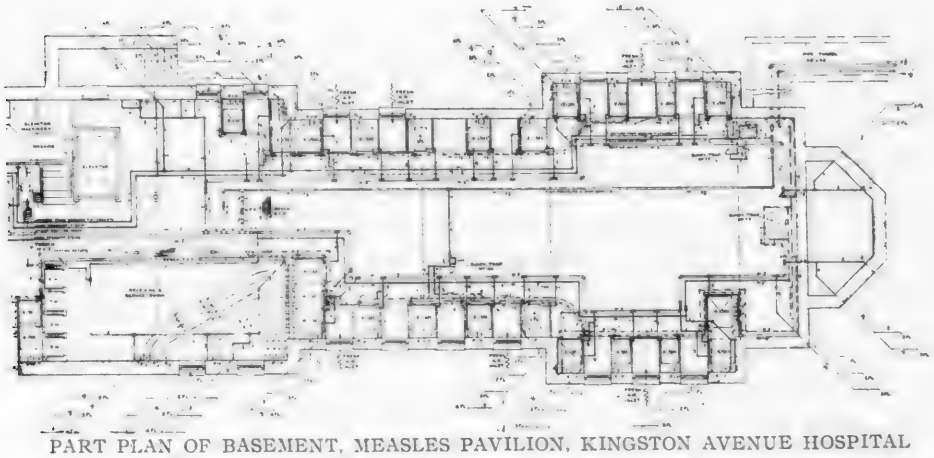
PIPE TUNNEL BEFORE GRADING WAS FINISHED

MANHOLE FOR LONG LENGTHS OF PIPE

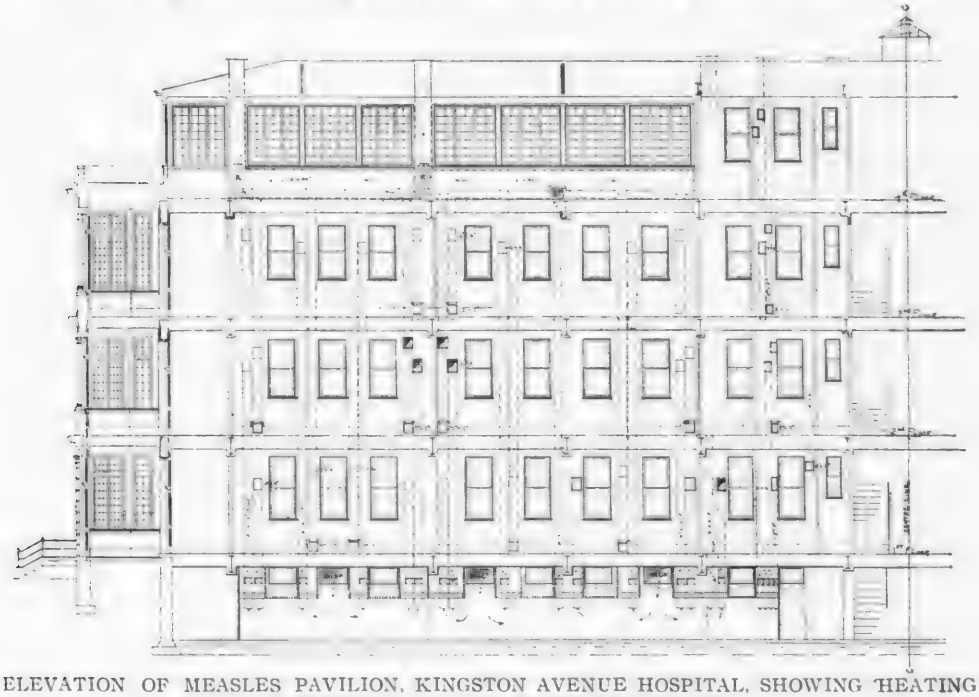
KINGSTON AVENUE (BOARD OF HEALTH) HOSPITAL, BROOKLYN

PIPE SUPPORTS AT ONE OF THE 45° BENDS

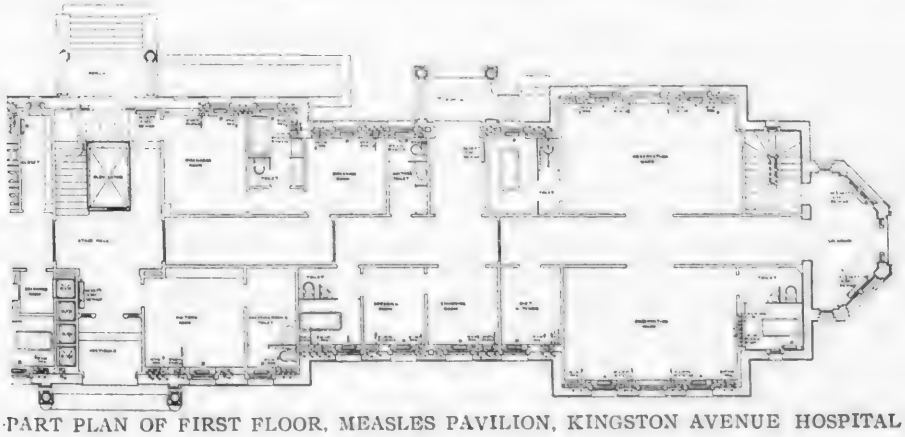
VIEW IN LONG RUN OF TUNNEL



PART PLAN OF BASEMENT, MEASLES PAVILION, KINGSTON AVENUE HOSPITAL



ELEVATION OF MEASLES PAVILION, KINGSTON AVENUE HOSPITAL, SHOWING HEATING CHAMBERS, COLD AIR INLETS AND FLUES



PART PLAN OF FIRST FLOOR, MEASLES PAVILION, KINGSTON AVENUE HOSPITAL

# Evolution In Heating

II

By J. M. W. Kitchen

### The Torridoor "Simplex" Heating System*

This system (Fig. 5) is suited for use in those cases where only a small sized steam or hot water boiler is needed, or can be afforded. In small very low cost heating boilers it is practically impossible to arrange heating surfaces or to so supply them in sufficient area to secure the utmost heat absorptive capacity. Hence, in such small boilers, and, in fact, in all large sized boilers having an entire up-draft travel of the gases, these gases escape from the boiler at a very high temperature, usually very much higher than the temperature of the water in the boiler.

In this system the heat of these gases is economized by running the gases through an economizer, such as is indicated in Fig. 5. Air for respiration is heated by the waste heat of the gases in the upward travel of air through the economizer, the hot gases traveling vertically downward in counter-current to the travel of the air as shown by the arrows.

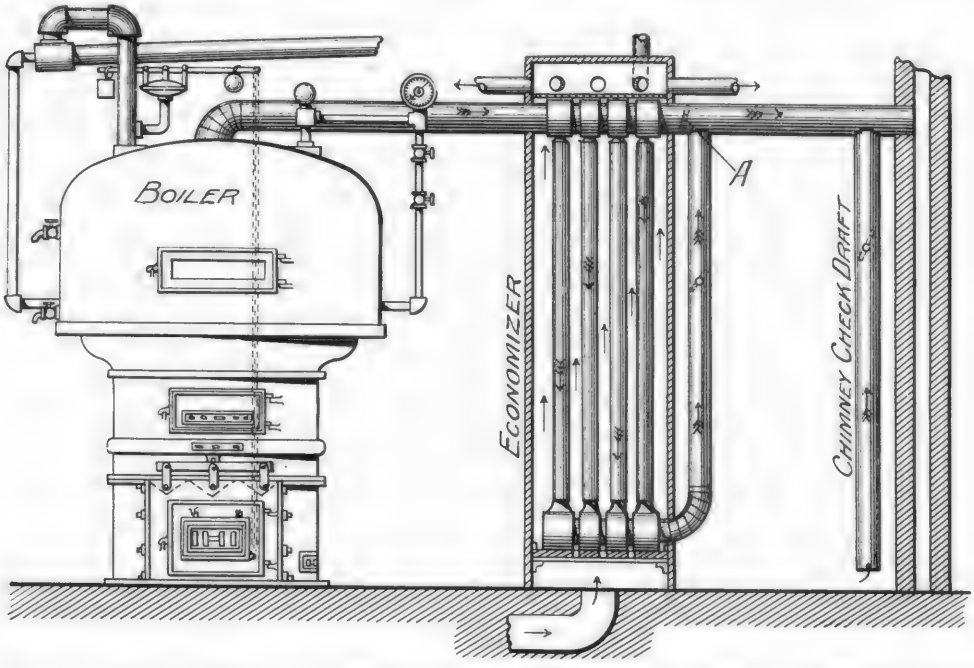



FIG. 5.—ARRANGEMENT OF TORRIDOOR SIMPLEX HEATING SYSTEM, SHOWING ECONOMIZER AND CHIMNEY CHECK DRAFT

By means of the damper *A* in the smoke pipe, the gases may be conveyed directly to the chimney, or any proportion of them can be by-passed downward through the economizer. In starting fires, or in increasing the draft, more or less heat would be conveyed directly to the chimney.

This economizer may be used in connection with any ordinary type of boiler, but the greatest reduction in the cost of installation, and in the cost of running, will be effected when

*Attention is drawn to the fact that any inventive ideas protected by patents, applied for or issued, which are disclosed in these articles are controlled by the Torridoor Power, Light & Heating Company of America.

The first article in the series was published in The Heating and Ventilating Magazine for November, 1908.

a boiler equally as efficient, and as low in cost as that of the Simplex-Disk type, which is shown in Figs. 6 and 7, is used. For a very small-sized boiler, calling for a minimum of grate area, the Disk type of boiler

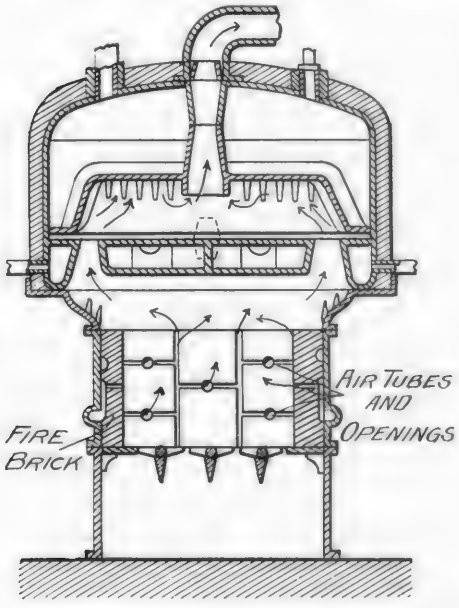



FIG. 6. — INTERIOR VIEW OF SIMPLEX-DISK TYPE OF BOILER, SHOWING AIR TUBES AND OPENINGS IN THE FIRE BRICK AROUND FIRE POT

offers advantages for economical production, and hence ability to sell at a low cost that is not possessed by other types. The special features in this design are for preventing contact of heating surfaces with solid fuel, which prevent formation of cinders and unburned gases at the periphery of the fuel mass, and slag at its interior, due to too intense heat at that point.

The heating surface is mostly secured by one horizontal extension of one single disk, rather than by piling one disk on another. Increased heat transmission is gained by providing fins or ridges in the lines of gas travel, and in the water spaces. These ridges and fins are so located and arranged as not to present obstacles in foundry practice, and yet secure a long travel and baffling effect with pressure against them of the heating gases. By surrounding the fuel mass with fire-brick, having properly arranged air ducts therein, a substantially perfect combustion is secured, as well as the very important advantage of an equalized rate of combustion, and rapidity in steaming. It should be noted here that to secure the greatest economy in fuel fully two thirds of the air for combustion should be supplied above the fuel mass, and so distributed as to prevent undue cooling of the gases at any one place, with consequent throwing out of commission of parts of the heating surface. But with so much introduction of air over the fuel mass there is necessarily a reduction in the rate of combustion, hence, a sufficient increase of size of grate area, and of heating surface must be provided to secure the fuel economy that can be secured in properly designed heating apparatus.

### NEW FORM OF RADIATOR

In this system, sectional radiation would of course be used, this being necessary in conjunction with the fresh air supply to carry out the pro-

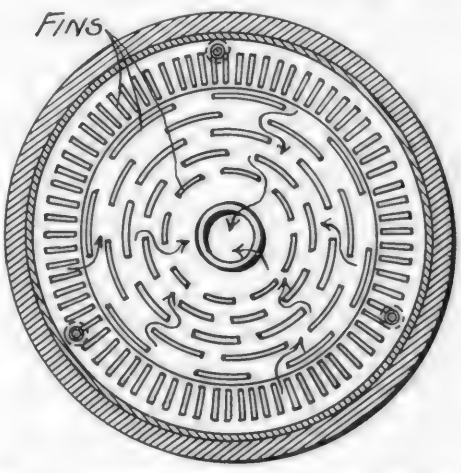



FIG. 7.—CROWN OF SIMPLEX-DISK BOILER LOOKING UPWARD FROM THE FIRE BED

vision for securing health, comfort and economy. Fig. 8 shows a compact form of sectional radiator, in which as many sections may be incorporated as may be desired, and each section may be of any size desired. At least three sections should be provided to secure comfort in

heating. It can be seen at a glance by the occupant of the space heated, whether any of these sections are open for the admission of steam or closed, simply by the elevation of each valve spindle or handle.

In steam heating there are no halfway measures for controlling that fluid that have proved satisfactory. It is either open valve, or shut valve; and where steam is used as the heating medium, a positively regulated radiation of this character will be found the most satisfactory. Where there are several radiators in the

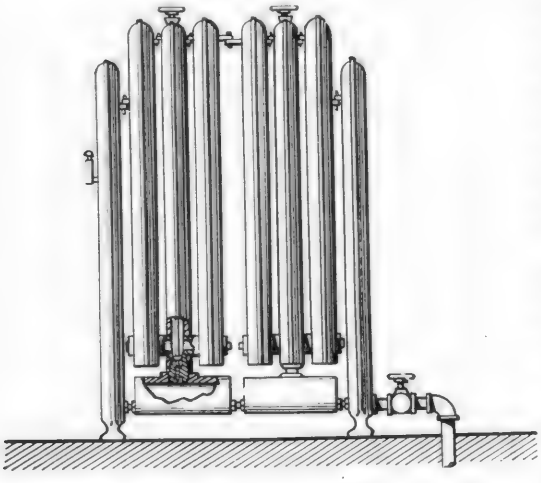


FIG. 8.—NEW TYPE OF SECTIONAL RADIATOR WHICH MAY BE PARTIALLY SHUT OFF

room, or where piping is distributed, the problem of sectional radiation is, of course, very simple. It is believed that the radiator here shown is the first satisfactory and effective design of a comprehensively satisfactory sectional radiator of compact form.

CONSTRUCTION OF ECONOMIZER

The economizer (Fig. 5) is composed of a number of upper and lower cast iron headers connected by galvanized iron tubing. One upper and one lower header, and the sheet iron tubes connecting them, form one section. These sections are closely joined together by push nipples and all are enclosed in a sheet metal case having an angle iron frame. The bottom of the casement is a metal sheet perforated with small equably distributed apertures through which the air finds entrance. The top of the casement acts as a diaphragm and has a central orifice through which the air passes for final distribution to air conduits. The air conduits, if carried to many rooms, need not be so large as the conduits ordinarily used in hot air heating, as the amount of air necessary for respiration is not so great as is needed in ordinary hot air heating.

If the warm air for respiration is introduced through one register only in the lower part of the dwelling, as in the hallway, the air conduit would be of sufficient size to convey what air is needed in the whole dwelling for respiratory purposes. The use of two sections of this economizer is recommended in small houses, and a larger number in houses proportionately larger.

This system provides air for respiration of as good a quality as that provided by any hot air furnace; it conveys heat for direct radiation to any desired positions in the house, and saves a large amount of heat that has been lost in old time heating systems, while the cost of installation is comparatively low.

(To be continued.)

## Training Workmen in Habits of Industry and Co-operation

By H. L. Gantt, Pawtucket, R. I.

(Abstract of paper read at the recent annual meeting of the American Society of Mechanical Engineers.)

Until within a few years the mechanic was necessarily the source and conserver of industrial knowledge, and on him rested, therefore, the responsibility for training workmen.

With the advent of the scientifically educated engineer capable of substituting a scientific solution of problems for the empirical solution of the mechanic, the responsibility of training workers naturally shifts to his shoulders. If he accepts this responsibility, and bases training on the results of scientific investigation, the efficiency of the workman can be so greatly increased that the manufacturer can afford to give those that take advantage of this training compensation far in excess of that usually paid for similar work.

# The Engineer and the People*

By Morris Llewellyn Cooke, Philadelphia, Pa.

In the work of the engineer there are three parties interested, i. e., the engineer, his employer and the public. While always recognizing the claim of this third party, engineers as a class have done little, directly, to satisfy it. The chief service rendered the public by the engineering profession has been one rendered indirectly by serving well the second party interested—the employer. It would appear that the time is near at hand when in matters in which they are specially qualified engineers must, individually and collectively, labor for the public interest with just as much fidelity and zeal as they work for their employer, and this not as public spirited citizens but rather as members of a public spirited profession.

If the standing of the engineering profession is to grow in the public esteem, it will be because of the effort of the profession to familiarize the public with its aims and ideals. Primarily this paper seeks to give some of the present day conditions which seem to demand a broadening of the lines of professional activity. A second object is to make a specific recommendation which, if adopted, it is believed will lead along a safe path to a stronger position for the mechanical engineer, considered as a member of the community. In this new position the mechanical engineer will have placed at his command powerful forces at present denied to him and yet absolutely necessary for the full accomplishment of his professional mission.

## THE ENGINEER AS A CONSERVATOR

There will probably be little protest against the conception of the engineer as the special conservator of the public interest in matters involving engineering. This view is certainly held by a majority of the leaders of the profession. Granting this much, no one who gives the matter thought will be likely to contest the assertion that in the manifold activities of the profession, the general public as such has been almost ignored.

It occurs to the writer that a radical, and in every way salutary, change can be brought about in the society's relations with the general public by the appointment of a committee to be known as the "Committee on Relations with the Public."

The work of a committee on relations with the public would of course have to be done within carefully though out and definitely prescribed limits. Even so, the work could be made very broad. The committee would doubtless seek to establish such relations with the lay press as would make its advice and help sought when engineering matters are up for public discussion.

## POPULAR LECTURES ON ENGINEERING

A committee on relations with the public might also provide for courses of lectures for the general public, to be given under the direct supervision of the committee in the Engineering Societies Building in New York, or under the auspices of local engineering societies at other places. Another important part of the work of such a committee would be to arrange that a fair proportion of the professional papers presented at the various meetings of the society should be of direct use and value to the public as well as to the mechanical engineer. The cumulative effect of these and of such other lines of work as would soon suggest themselves would be very marked. It is believed that through the work instituted by such a committee the mechanical engineer and the general public

*Abstract of a paper read before the American Society of Mechanical Engineers, Dec. 2, 1908

could be brought in a few years to a much better understanding.

The records of engineering in the early days of the last century show that engineers had not then learned how to coöperate with each other. Up to a comparatively recent date the professional knowledge of an engineer was his own property and he felt that in imparting any of this knowledge to another engineer he was doing himself a decided injury. Discussions between engineers were carried on mainly with the object of doing each other harm rather than good. The large number of engineering societies, with the fundamental object of the free exchange of engineering data between their members, show how thoroughly engineers have learned that the general policy of giving freely of their knowledge to their fellow practitioners increases rather than diminishes their effectiveness and, in proportion, their earning power. In proposing the appointment of this new standing committee, the writer suggests only the extension of this coöperation to include the public. There is good reason to believe that engineers have as much to gain from coöperation with the public as they have undoubtedly gained from coöperation with each other.

### ASSISTANCE NEEDED IN EXPERIMENTAL WORK

As the range of human knowledge widens, the expense involved in carrying on the investigation and experimental work necessary to progress in such a profession as ours increases very rapidly. For the engineering profession to keep pace, for instance, with the progress being made to-day in medical science, our investigators and experimenters must have larger financial resources at their disposal than they have enjoyed in the past. Such foundations and bequests must come for the most part from those unconnected with the engineering profession and from those who put a value on the engineer's work for mankind. Such assistance will result only from a widespread appreciation of the engineer's achievements for the public good and of the requirements of engineering.

It is no longer possible for either a profession or a craft to corner information and hold it for its own use. Broadly speaking, those who seek information in any field can obtain it, or at least enough to answer their immediate purposes. And therein lies a danger. This danger would in itself constitute a sufficient reason for the engineer to take the public into his confidence. For after all it is public opinion and not the dictum of the engineering fraternity which finally decides the large questions of engineering practice. How much better it would be then to join forces with the people, to work out with the people the people's problems and to build up in the lay mind such a confidence in our devotion to the people's cause that they will be willing to let us lead in matters where our training especially qualifies us to do so. Only by educating the public to understand and appreciate the work of the engineer, can the public be made to demand the best that can be devised and executed by trained and skillful men. This will have a two-fold benficial effect on the profession in that it will make more work for the engineer and will give the public that general acquaintance with engineering matters which will make it suspicious of short-cuts.

### BROADER TENDENCIES OF THE DAY

There may be some who feel that in launching a movement of the kind proposed the society would run the risk of getting into difficult positions and even of antagonizing friendly interest. Judging from what is going on around us in this republic to-day, and in fact throughout the world, a step of this kind will commend itself so powerfully to the public as to bring to our standard a hundred friends for every one we could possibly lose.

However, were this not so there is no sacrifice which the profession ought not to be glad to make to put itself in line with the most advanced ideas of public service. For after all the greatest value to come out of the broader activities is the inspiration to the individual engineer in his everyday work from this closer association with that great employer, the people, for whom in the last analysis all ultimately useful work is done.

## *Installing Heating Systems in Close Quarters*

I—Importers' and Traders' National Bank.

II—The New York Law School

One of the standing complaints of heating and ventilating engineers is the lack of space usually afforded them for the installation of the apparatus required for the successul operation of a heating system. This necessitates not only an adequate and correct design, but also the cramping of the plant to fit quarters which, under other conditions, would be far too small for it.

Two methods of dealing with this problem are illustrated in the accompanying plans of the mechanical equipment of the Importers' and Traders' National Bank building, at Murray street and Broadway, New York, and in the new building for the New York Law School, at 172-174 Fulton street, New York.

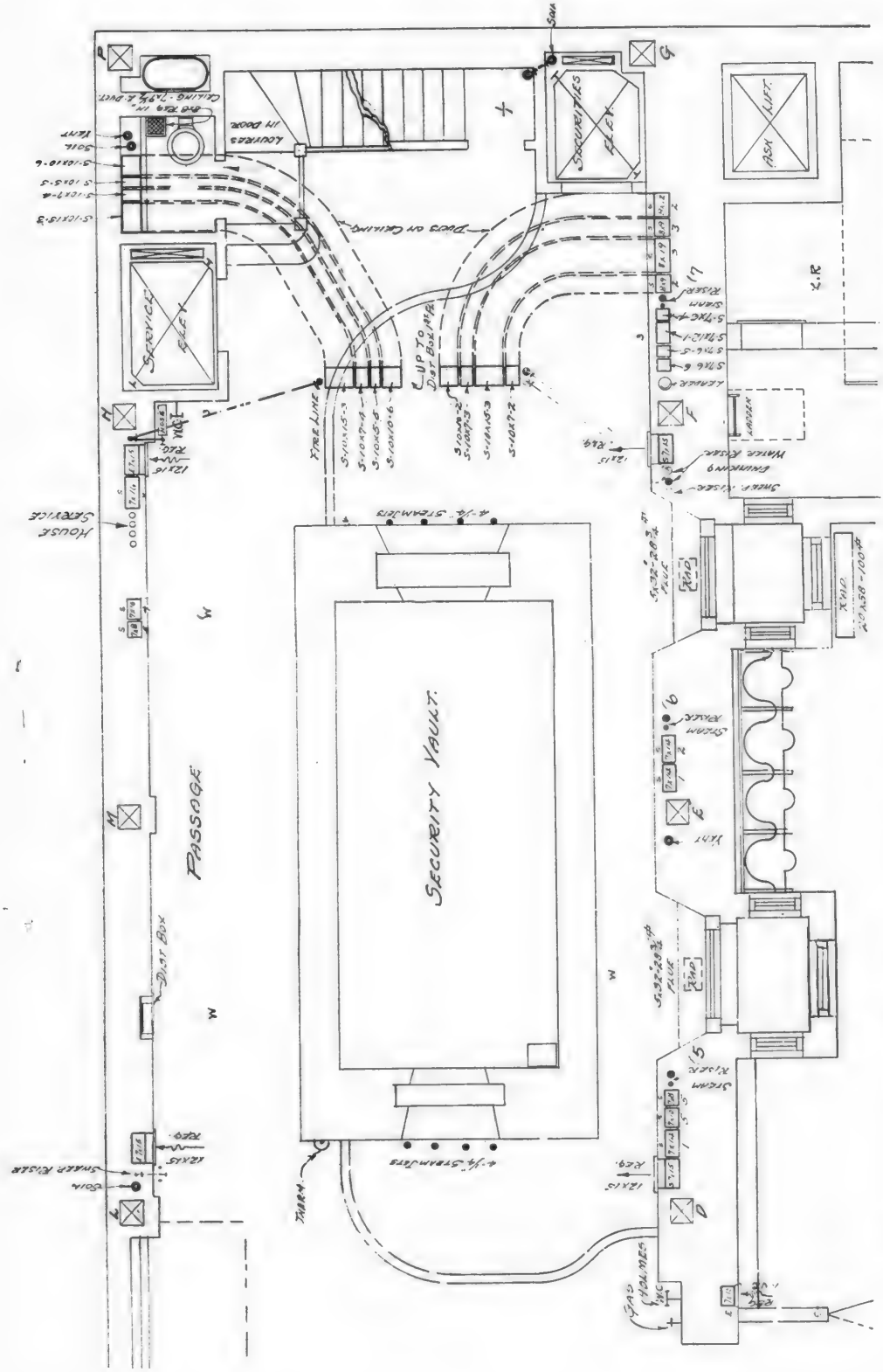
In the first case, that of the bank building, the conditions were unavoidable on any ground, as the plot on which the building stands has but a 25 ft. frontage and a depth of 103 ft. The results achieved by the architect on this restricted area are among the most interesting achievements in this type of building construction and afford a striking example of the possibilities in this direction. In like manner, the assembling of the pipe mains in the sub-basement was a work that taxed the ingenuity of the engineers, especially as a large part of the sub-basement is taken up with three piers supporting the vault.

In the case of the New York Law School building, the engineers took the bull by the horns, so to speak, and abandoned the basement entirely, concentrating both the supply and exhaust fans, as well as much of the other heating and ventilating apparatus on the roof. This arrangement was made possible owing to the fact that only certain portions

J. H. Freedlander, Architect

THE IMPORTERS' AND TRADERS' NATIONAL BANK, NEW YORK

of the building, a small lecture room on the 8th floor, the law library on the 9th floor, and the lecture rooms on the 10th and 11th floors are connected to the ventilating system.




J. H. Freedlander, New York, Architect

Pattison Bros., New York, Consulting Engineers

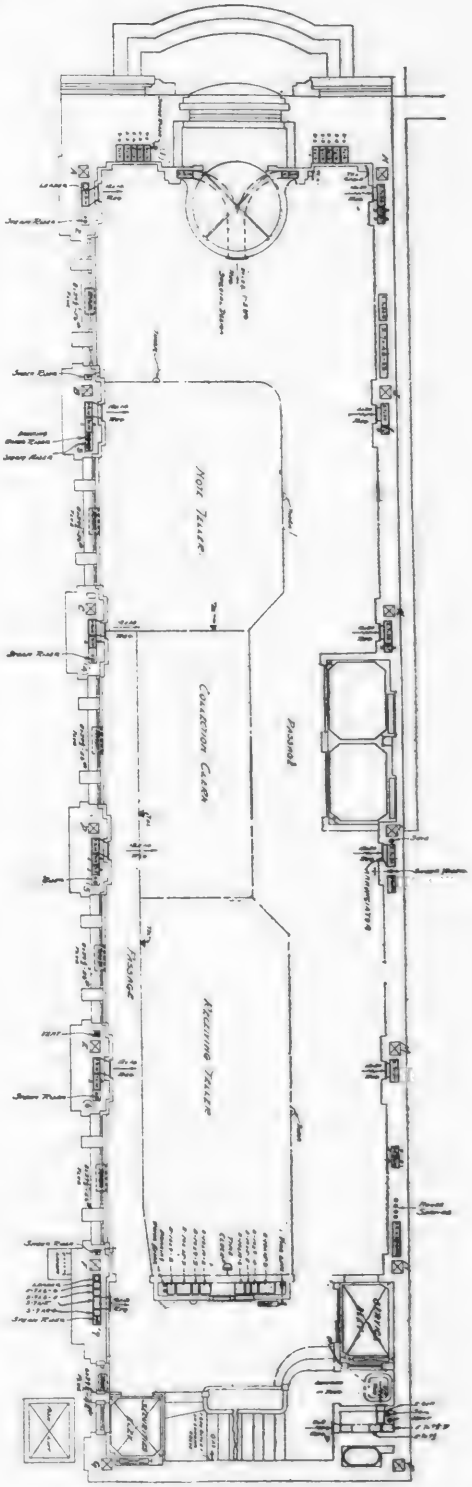
PART PLAN OF BASEMENT, IMPORTERS' AND TRADERS' NATIONAL BANK, SHOWING METHOD OF VENTILATING SECURITY VAULT ROOM

## The Importers' and Traders' Bank

A Mills cast-iron sectional boiler, having 1,020 sq. ft. of fire surface and 24 sq. ft. of grate surface, supplies the steam for heating the building. The radiation includes 2,505 sq. ft. of direct and 92 sq. ft. of indirect, also 2,440 lineal felt of heating coils. The piping is also connected with the street service of the New York Steam Company. The street main was connected with the old building on this site, but it was necessary to bring it down to a point considerably lower near the sub-basement ceiling, thence through a meter, reducing valve, etc., to the heating main. The reducing valve 4 in. x 8 in., and by-passed, reduces the street pressure to about 5 lbs., but is adjustable, in case higher pressures are desired. The steam and return risers are taken out of the main near the sub-basement ceiling, thence over to the riser line and up. Among the other apparatus in the sub-basement is a return tank 36 in. long and 18 in. in diameter. It is arranged to be drained into the floor drain to the sump. It is set at the proper height to drain the heating coils and flood the pumps. Two Worthington return pumps 4 in. x 2 8/2 in. x 6 in. are installed, to work on the heating steam pressure, either on the boiler or street steam. Both pumps are equipped with a pump governor for automatic action. They are piped to pump into the boiler and through the cooling coil in the air duct into the sewer. The cooling coils, however, are by-passed so that the water of condensation can be returned direct to the boiler if the building is heated by the boiler.

The street service steam supply for the two pumps is taken out of the street service back of the reducing valve and there is a steam connection independent of the pump governor. They exhaust through a grease extractor into the steam main.

The hot water tank for house service has a capacity of 300 gals. per hour. It has a 2 in. steam connection and also a 1 in. medium pressure



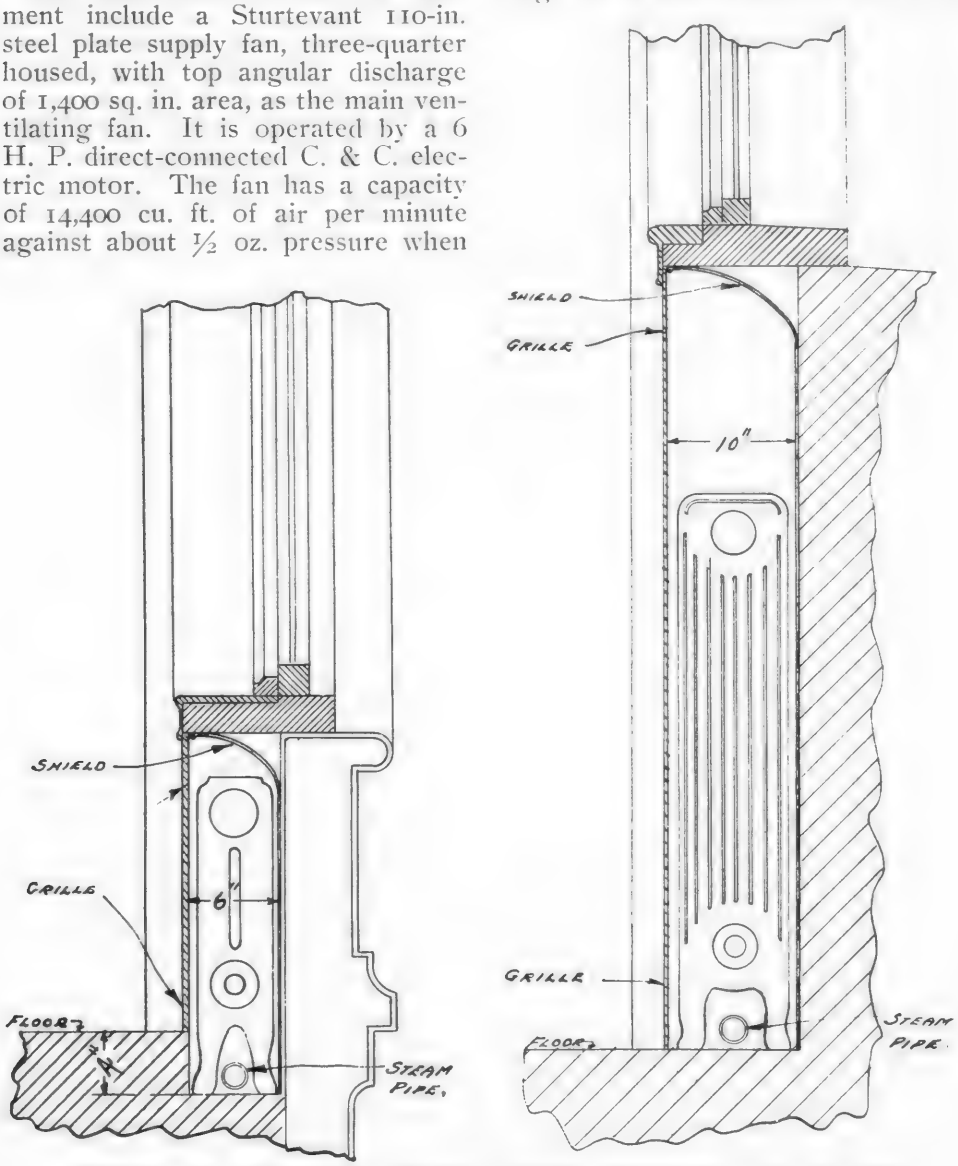

FIRST FLOOR PLAN IMPORTERS' AND TRADERS' NATIONAL BANK

live steam connection for warming up. The temperature of the water is regulated by a tank temperature regulator.

The fans located in the sub-basement include a Sturtevant 110-in. steel plate supply fan, three-quarter housed, with top angular discharge of 1,400 sq. in. area, as the main ventilating fan. It is operated by a 6 H. P. direct-connected C. & C. electric motor. The fan has a capacity of 14,400 cu. ft. of air per minute against about ½ oz. pressure when running at 225 R. P. M. This, as well as the other fans, can be operated at any desired speed.

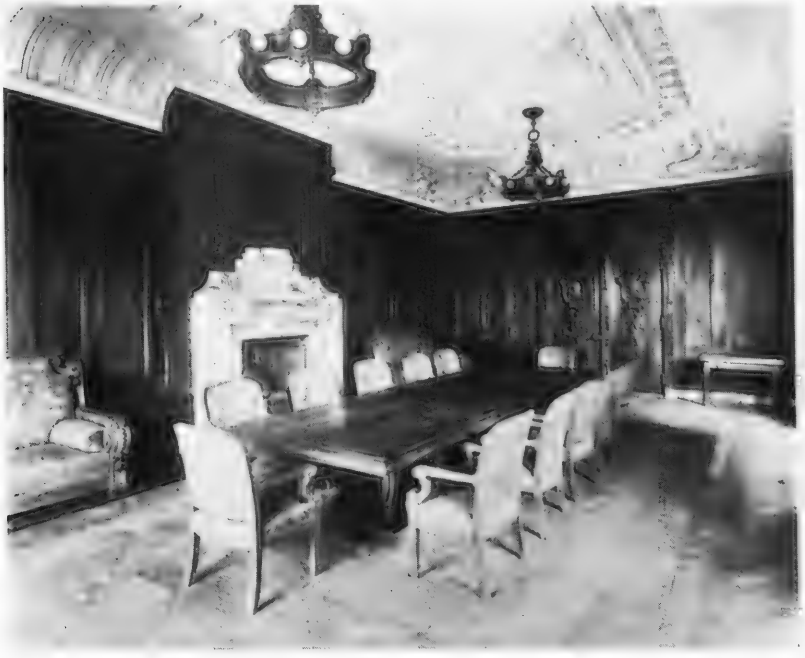
For the exhaust from the sub-basement and also from the basement toilets, if the other fan is shut down, there is a similar 50-in. fan with a 325 sq. in. outlet, and a capacity of 2,700 cu. ft. per minute against ½ oz. pressure at 380 R. P. M. It is full housed with top vertical discharge, and is direct-connected to a 1 H. P., C. & C. motor. If the large fan is shut down the small one may be run and by changing the dampers may exhaust from the sub-basement and basement toilet and locker room. The locker room in the basement is heated by wall coils.

On the roof are two 36-in. vertical Blackman exhaust fans, each capable of discharging 7,060 cu. ft. of air per minute at 360 R. P. M. Both

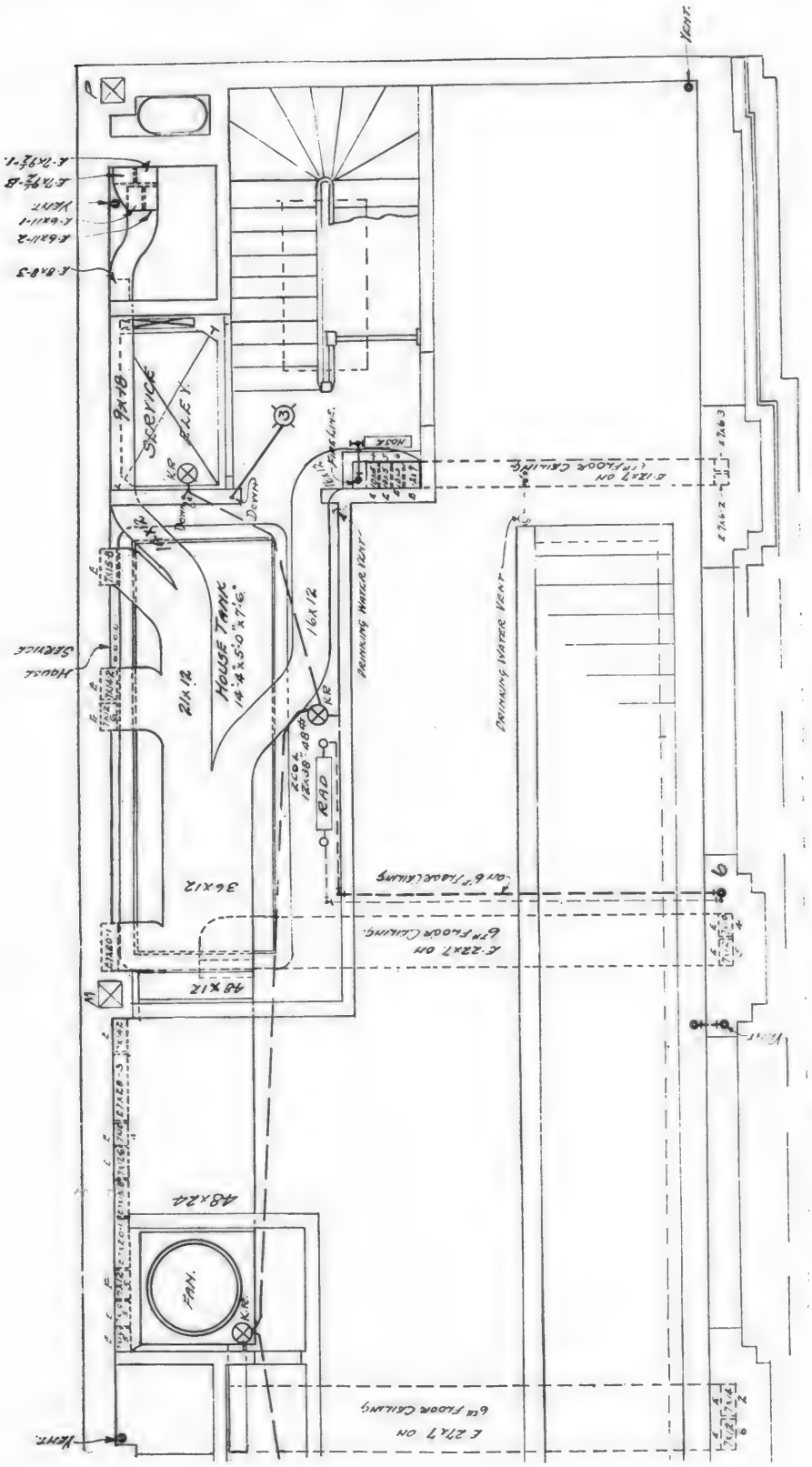



METHODS OF CONCEALING DIRECT RADIATORS, IMPORTERS' AND TRADERS' BANK BUILDING

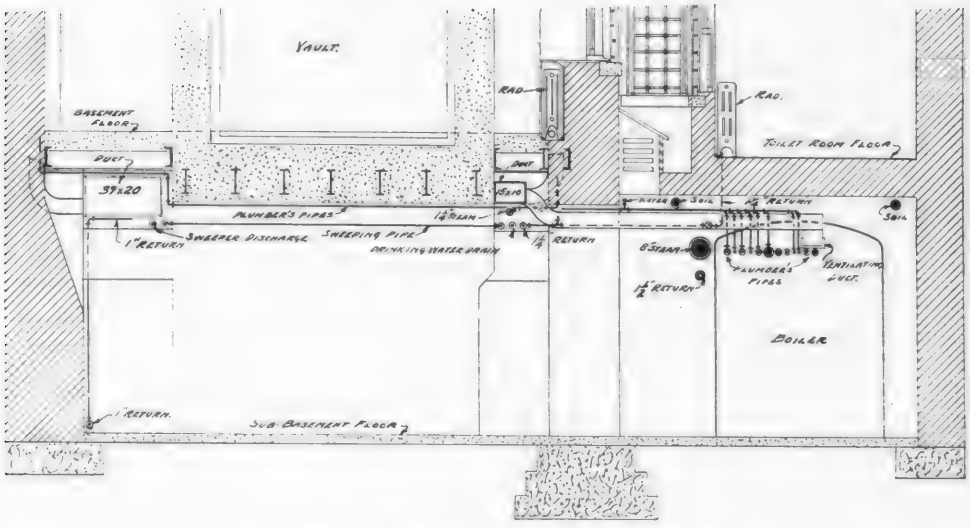
MAIN BANKING FLOOR, IMPORTERS' AND TRADERS' NATIONAL BANK,
LOOKING TOWARD THE FRONT ENTRANCE



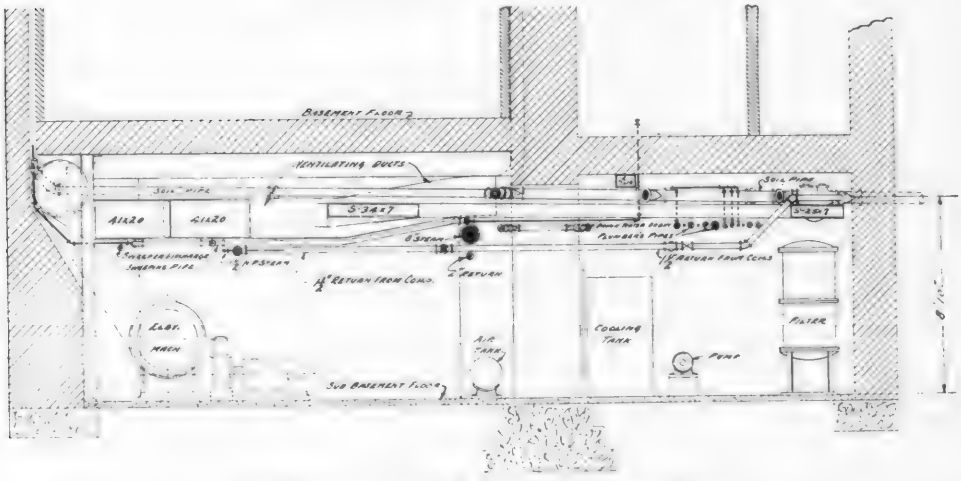
DIRECTORS' ROOM, IMPORTERS' AND TRADERS' NATIONAL BANK,
SHOWING FRESH AIR SUPPLY AND VENT REGISTERS



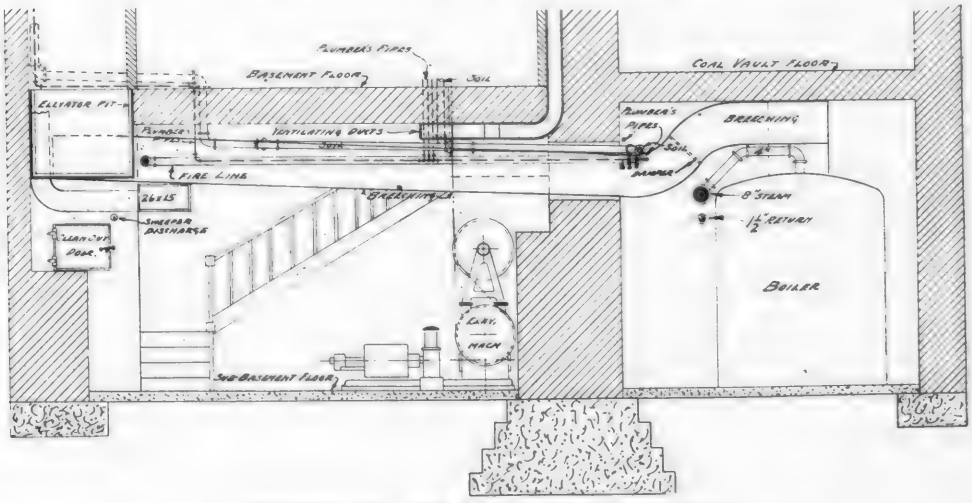

J. H. Freedlander, New York, Architect
Pattison Bros., New York, Consulting Engineers
PART PLAN OF ROOF, IMPORTERS' AND TRADERS' BANK BUILDING, SHOWING VENT DUCTS AND FAN




SECTION ON LINE Y-Y (See Sub-Basement Plan)

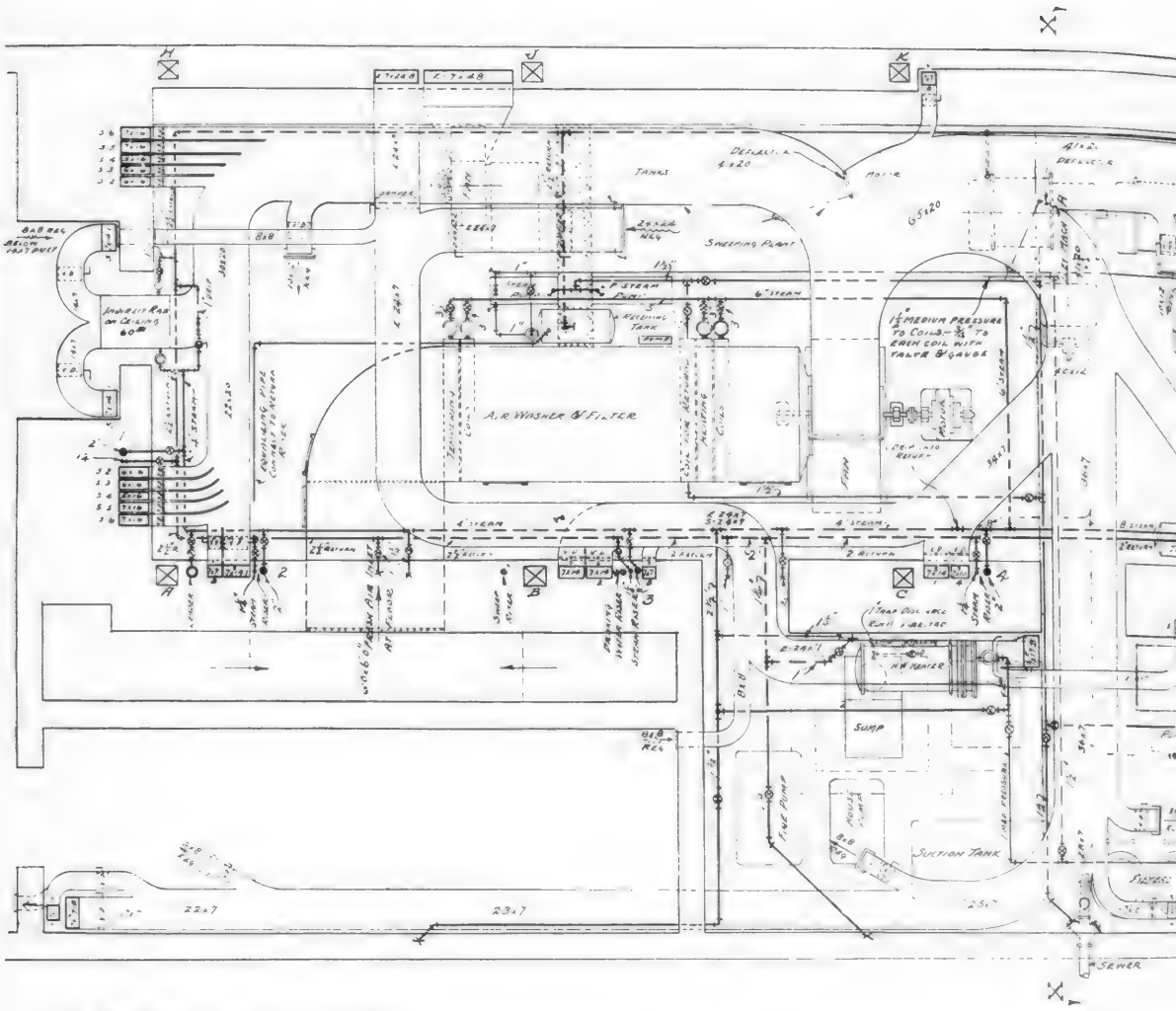



SECTION ON LINE X-X (See Sub-Basement Plan)




SECTION ON LINE Z-Z (See Sub-Basement Plan)

SECTIONS THROUGH SUB-BASEMENT OF IMPORTERS' AND TRADERS' NATIONAL BANK SHOWING HEATING, VENTILATING AND PLUMBING SYSTEMS




J. H. Freedlander, New York, Architect

PLAN OF SUB-BASEMENT, IMPORTERS' AND TRADERS' NATIONAL BANK BUIL

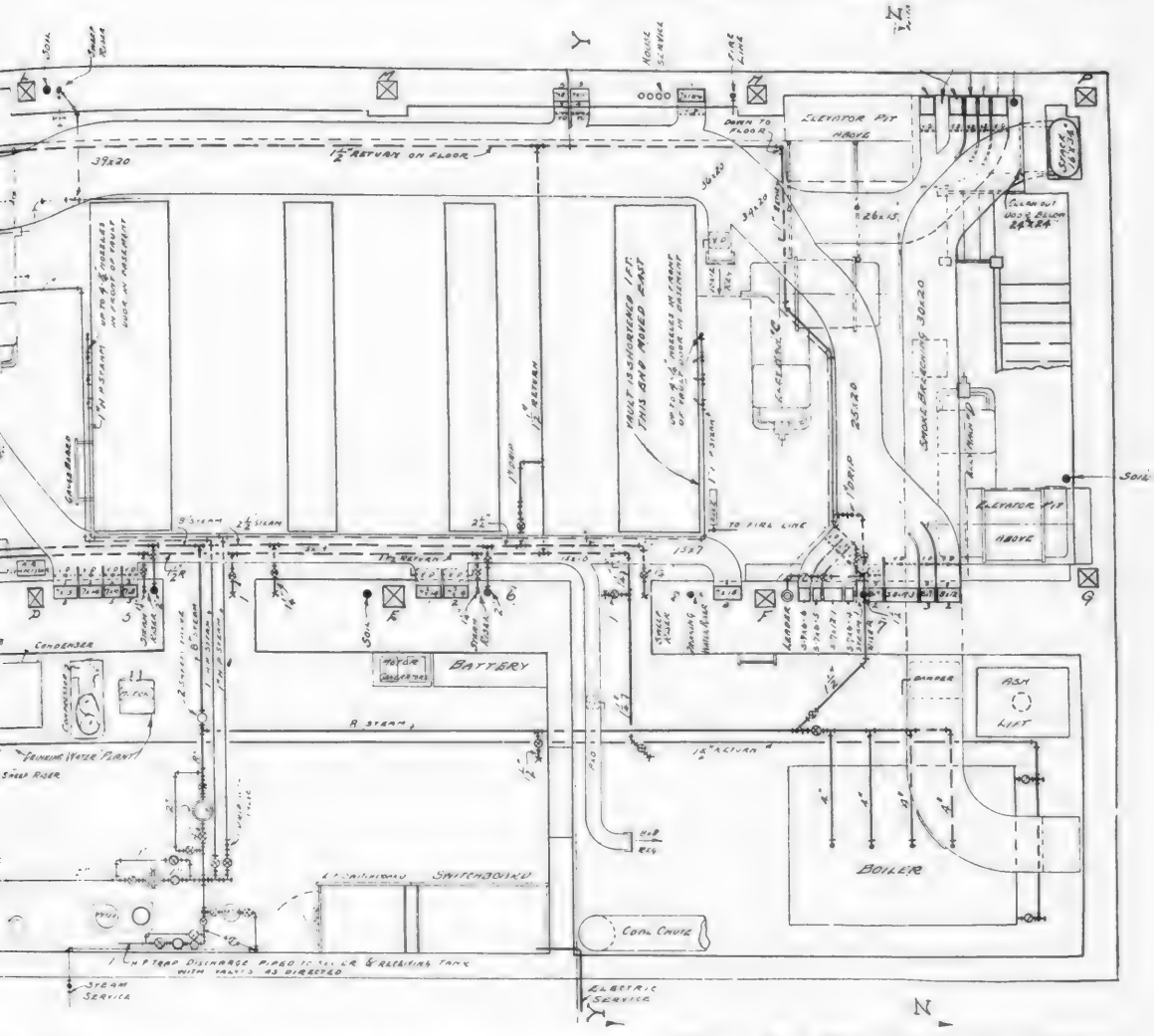
of these fans are direct-connected to a C. & C. 1 H. P. electric motor.

Both the tempering and heating coils in the fresh air intake are built of 1-in. pipe in two sections of four rows each, each arranged in miter coils and having a free area of 20 sq. ft. 1,200 lineal feet of pipe is used in each coil. There is a third coil similar to these and built alongside of them for cooling the return water when it is to be pumped into the sewer.

The air washer installed is a Thomas Acme. It is designed to remove all impurities from the air without increasing the humidity more than 2%, unless it is desired to do so. Among the conditions stipulated is that the increased resistance of the eliminators shall not exceed 3/10 in. of water. The speed of the air through the spray chamber is not to exceed about 400 ft. per minute. It was also stipulated that the washer casing from the tempering coils to the reheating coils should be of 16 oz. sheet copper. The eliminator plates are also of copper.

The arrangement of the registers in the various rooms is in accordance with the usual practice, with the supply registers located 8 ft. above the floor and the exhaust registers 3 in. above the floor, except the toilet exhausts are near the ceiling.

The entire system is automatically controlled by the Johnson tempera-




Pattison Bros., New York, Consulting Engineers

DING, SHOWING GENERAL DESIGN OF HEATING AND VENTILATING SYSTEM

ture regulating system. Diaphragm valves are placed on both the tempering and heating coils, the former having two thermostats, one in the cold air duct and the other in the tempered air chamber.

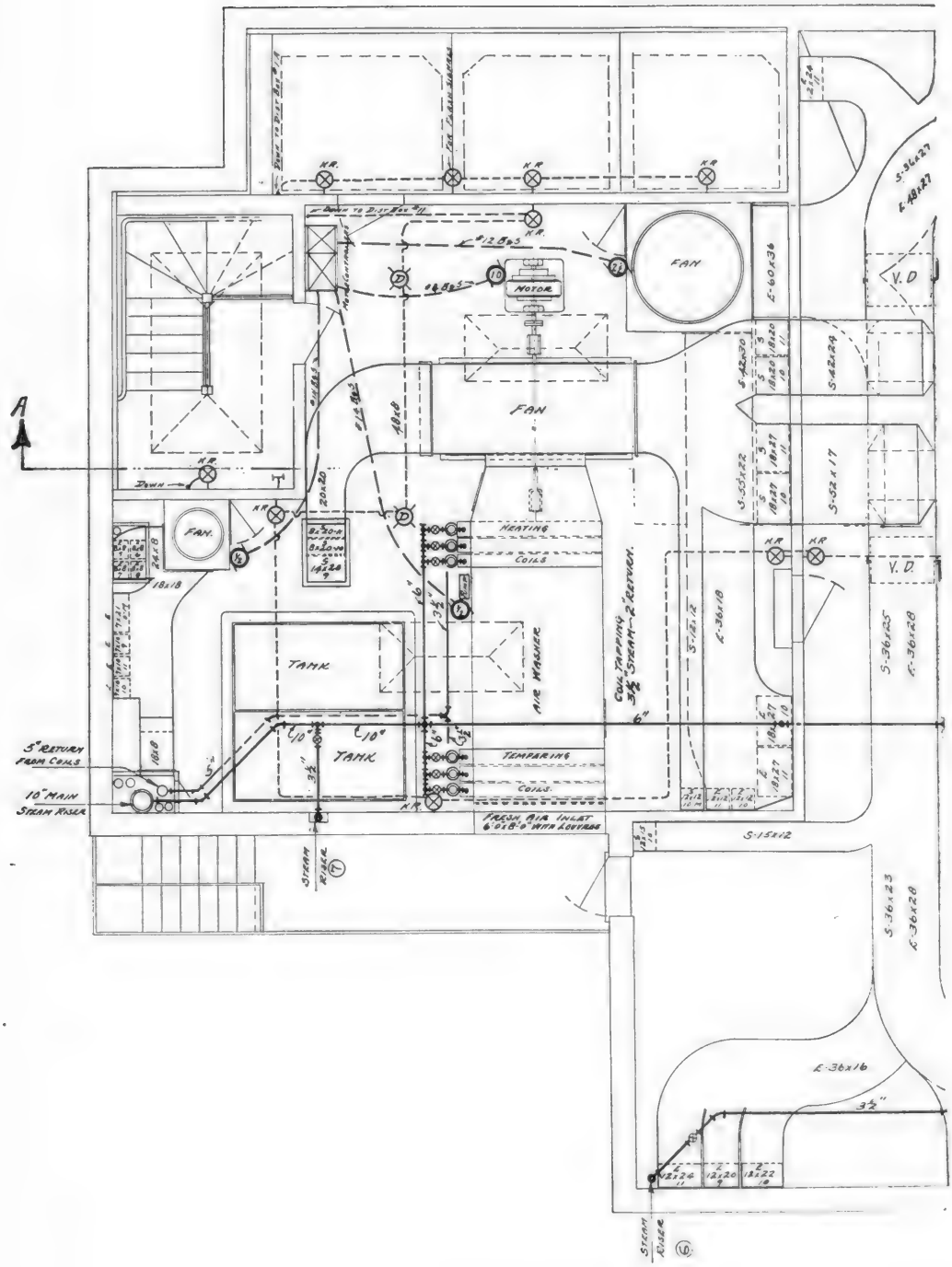
The architect of the building is J. H. Freedlander, 244 Fifth Ave., New York; the designing engineers, Pattison Bros., Flatiron Building, New York; and the contractors, Johnson & Morris, New York.

## *The New York Law School Building*

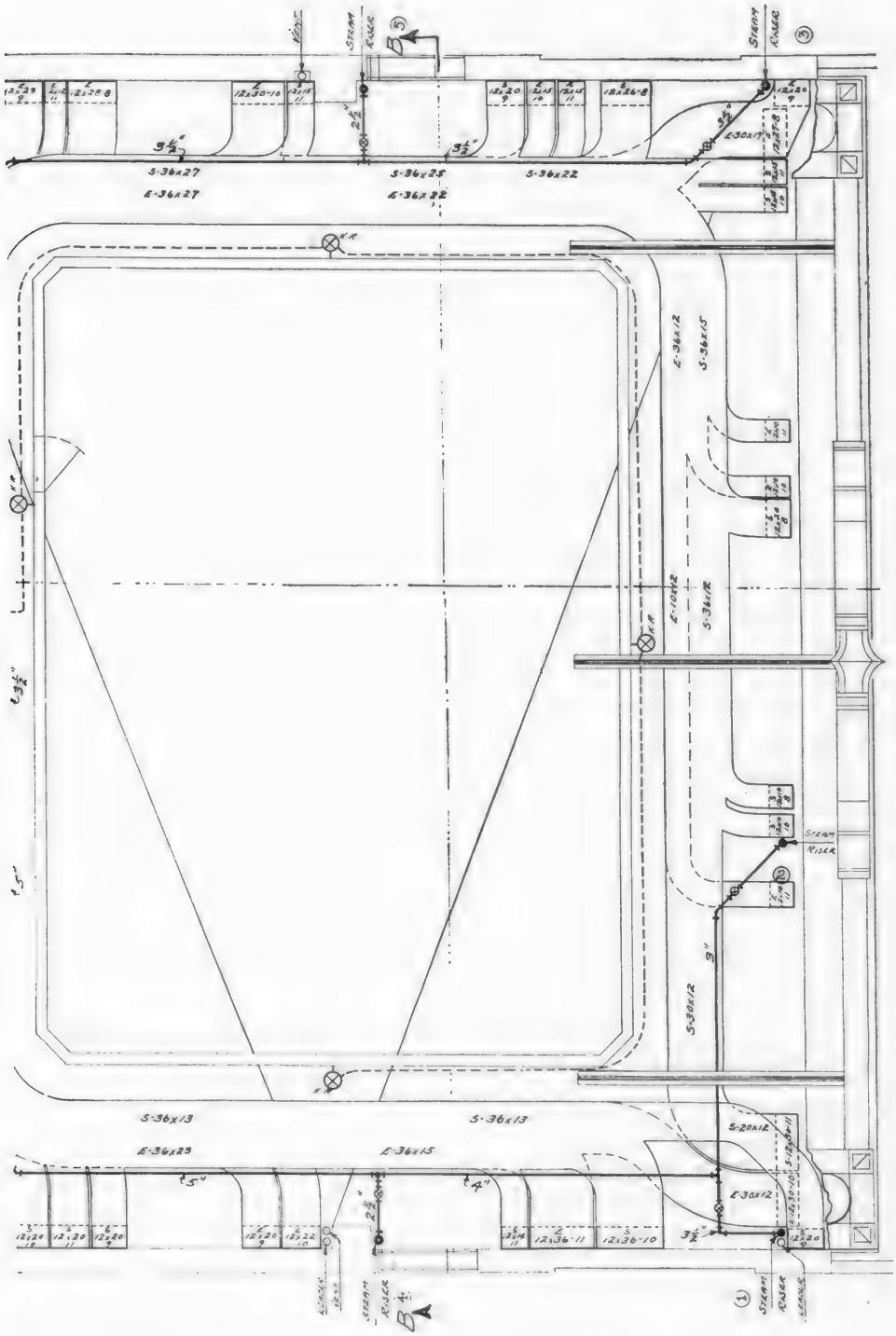
While the plant installed in the New York Law School building has many features similar to that in the Importers' and Traders' Bank, having been designed by the same engineers, a notable departure was adopted in the installation of much of the heating and ventilating apparatus on the roof.

As in the case of the bank building, the heating system, mostly direct radiation, is arranged to work either on the street service of the New York Steam Company or from the boiler plant installed in the building. Two Fitzgibbons boilers are installed, each having 800 sq. ft. of heating surface.

The steam main from the street service enters the basement where a




PLAN OF ROOF, NEW YORK LAW SCHOOL, SHOWING



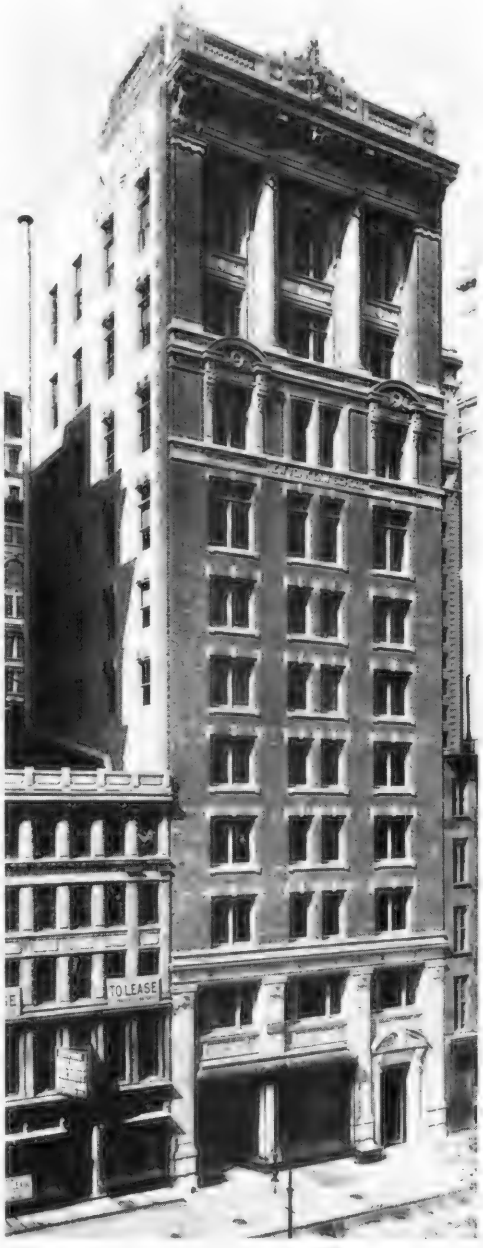

ARRANGEMENT OF HEATING AND VENTILATING APPARATUS

4 in. x 8 in. reducing valve reduces the pressure to 5 lbs. The system is one pipe with overhead main running around in the roof enclosure, supplying the coils and vertical supply lines. The overhead main drains down the risers, while the return and air pipes from the coils run down separately where the steam main comes up. The risers run down in the side walls and except in the boiler room run under the basement floor in trenches and join the return mains at the point shown in the plans. The return mains are all run under the floor to duplicate 3 in. traps arranged to discharge into the boilers, or, if the boilers are not in use, the traps discharge through the boilers to the sewers, the boilers being used as cooling coils. The main air pipes are run 1 in. on the basement ceiling and drain to the sink in the boiler room.

As already stated all the fans are located in the roof house. The supply fan is a Sturtevant, 140-in. steel plate, full housed, with a top horizontal and bottom angular discharge. The discharges are 2,100 and 200 sq. in., and the fan has a capacity of 27,000 cu. ft; of air per minute against about ½ oz. pressure when running at a rate of 180 R. P. M. The exhaust fan is a 60-in. vertical propeller, capable of discharging 26,000 cu. ft. of air per minute when run at about 275 R. P. M. There is also a similar fan 23 in. in diameter for the toilets with a capacity of 4,000 cu. ft. per minute at 650 R. P. M.

The fan motors, all of Diehl make, are direct-connected and are for direct-current at 235 volts. The motor for the main supply fan is 10 H. P., and that for the exhaust fan is 2½ H. P., while a ½ H. P. motor operates the toilet exhaust fan.

The tempering coil in the fresh air intake is made up of 2,160 lineal feet of 1-in. pipe, built in three sections of four rows each, arranged in miter coils, having a free area of 22½ sq. ft. A similar heating coil is placed on the discharge side of the supply fan. These coils and fans, together with a Thomas Acme air

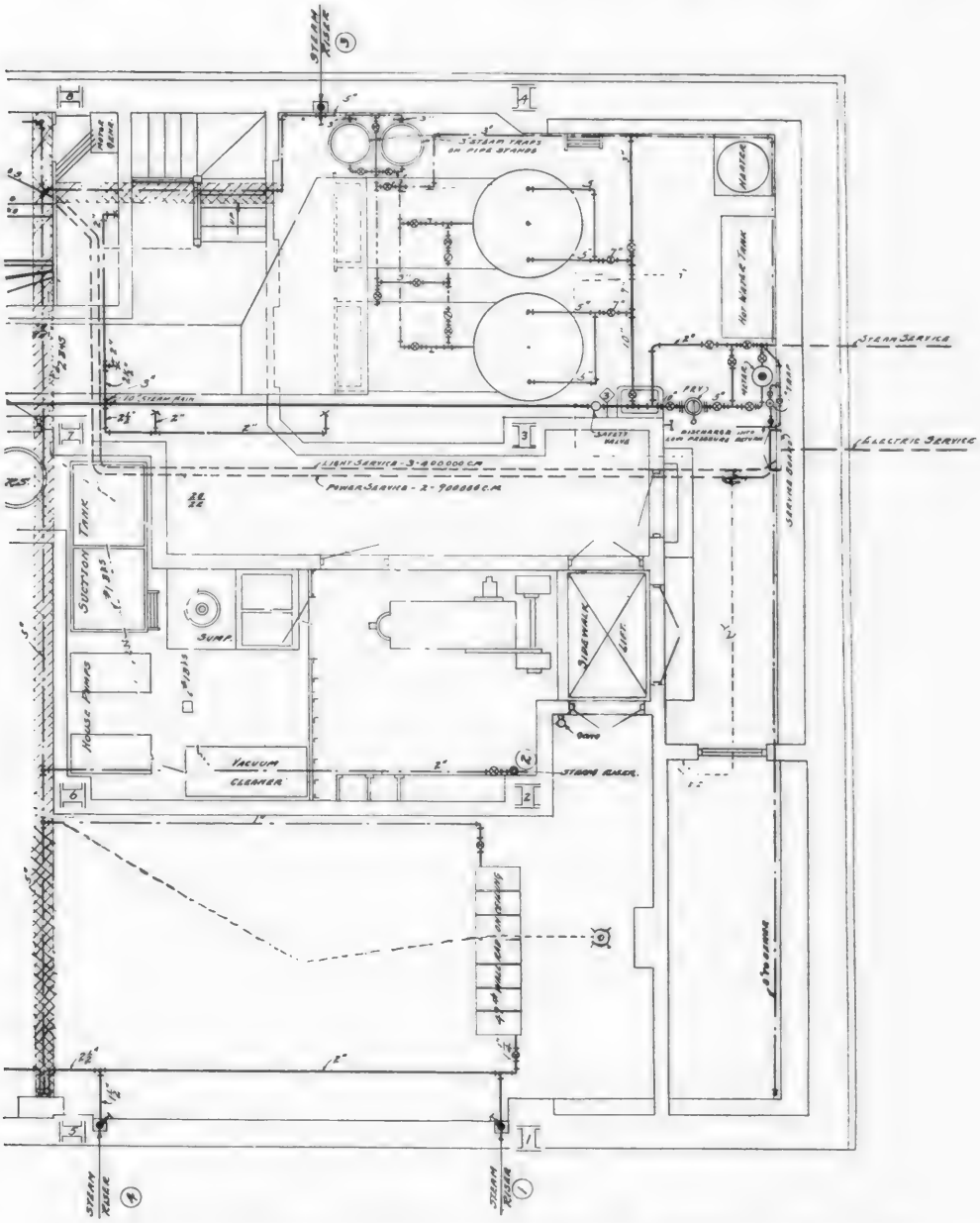



C. P. H. Gilbert, Architect

THE NEW YORK LAW SCHOOL BUILDING

washer, complete the ventilating apparatus.

There is automatic control on the tempering and heating coils of the ventilating system and on the direct



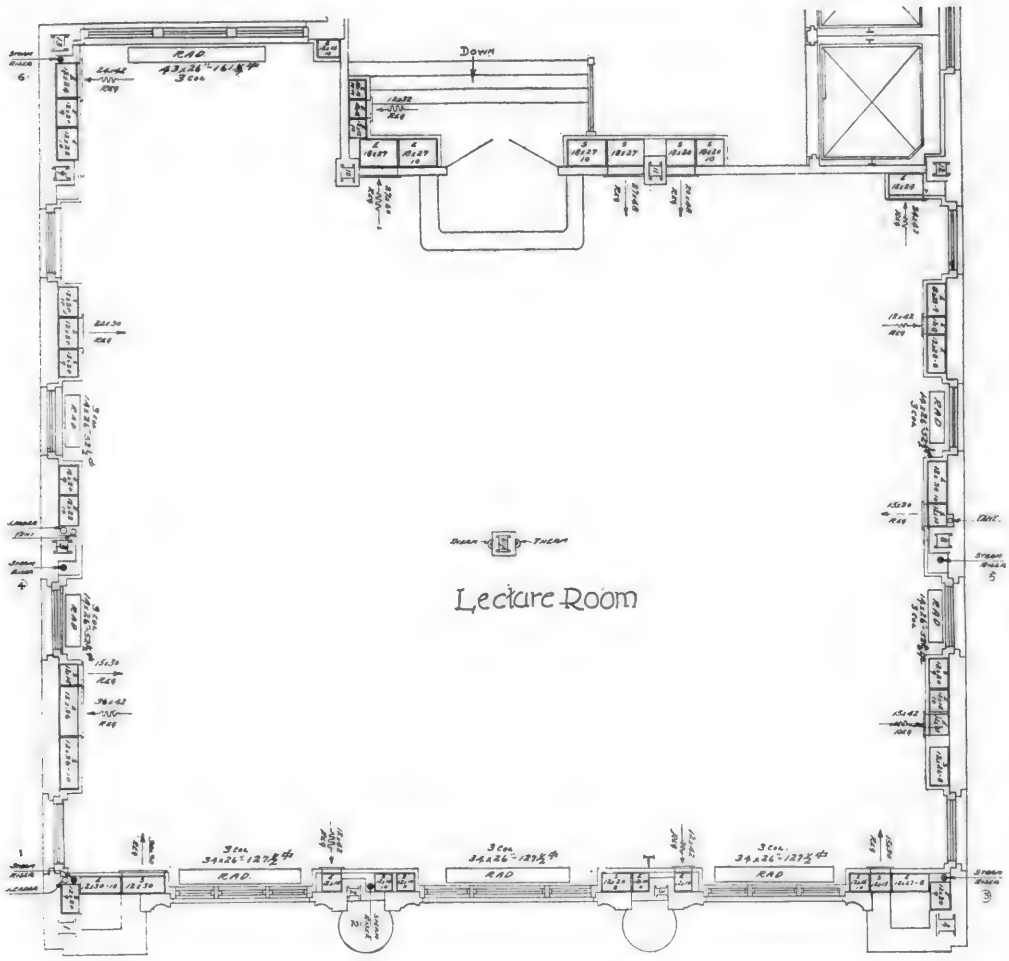

PART PLAN OF BASEMENT, NEW YORK LAW SCHOOL, SHOWING BOILER ROOM

radiators in the lecture room on the 8th floor and in the main rooms on the 9th, 10th and 11th floors. The Powers temperature regulating system is used.

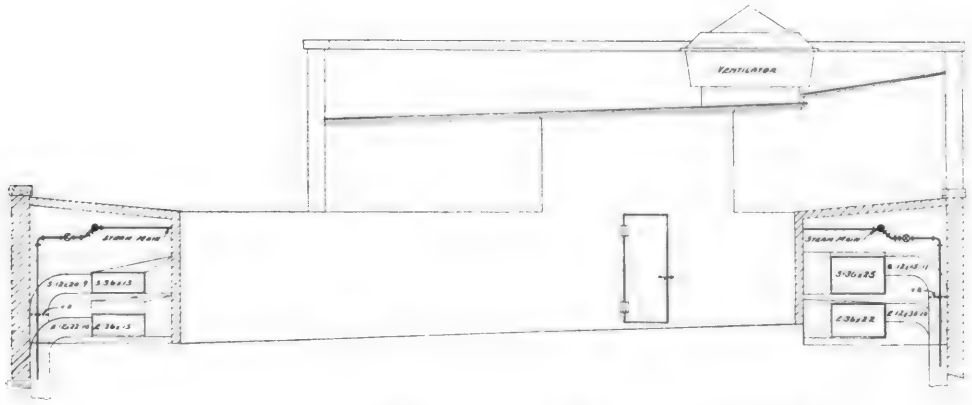
C. P. H. Gilbert, 1123 Broadway, New York, is the architect of the building and Pattison Bros. are the designing engineers. The work was executed by Gillis & Geoghegan, New York.

### American Society of Mechanical Engineers

December is distinguished, as usual, by the professional sessions of a number of engineering societies. While a large portion of the papers and reports have but an indirect bearing on the work of the heating and ventilating engineer, several of the papers read before the American Society of Mechanical Engineers, December 1-4, will be found of interest to the heating profession, and they are presented herewith in abstract.




HEATING AND VENTILATING ARRANGEMENTS IN LECTURE ROOM ON ELEVENTH FLOOR OF NEW YORK LAW SCHOOL



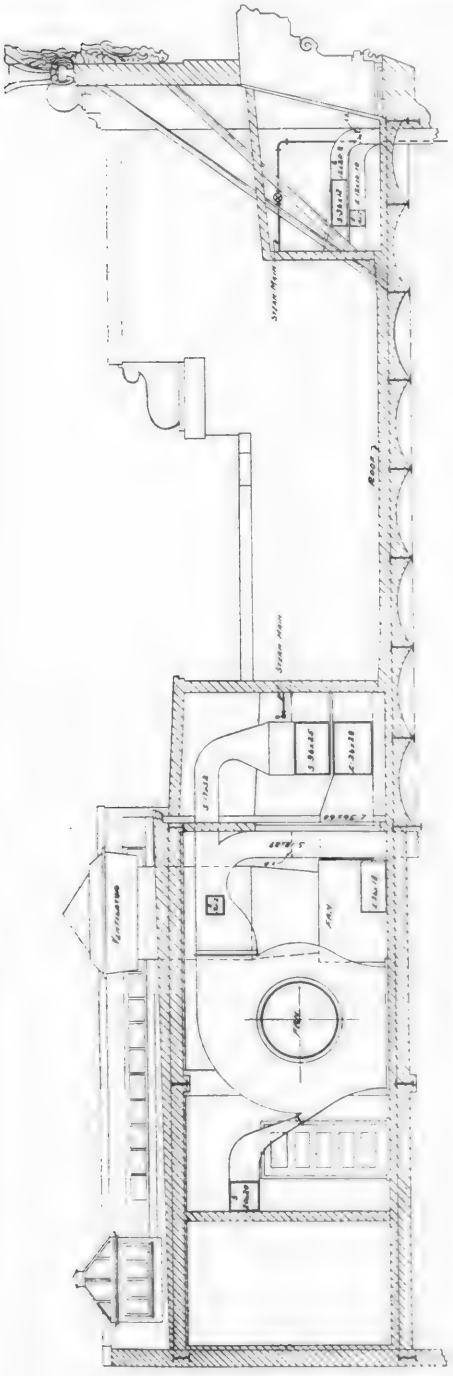

SECTION OF ROOF PLAN, NEW YORK LAW SCHOOL ON LINE B-B

### A METHOD OF OBTAINING RATIOS OF SPECIFIC HEAT OF VAPORS

(By A. R. Dodge, Schenectady, N. Y.)

A method of obtaining ratios of specific heats is given which does not involve the use of available steam tables conceded to be too inaccurate for such investigations, nor a condition in which the steam is presumed to be without moisture or superheat.

This method is based upon the expansion of initially superheated fluid in a throttling calorimeter, and tables are included showing data for steam.



SECTION OF ROOF PLAN, NEW YORK LAW SCHOOL ON LINE A-A

### THE TOTAL HEAT OF SATURATED STEAM

(By Dr. Harvey N. Davis, Cambridge, Mass.)

It has for some time been suspected that Regnault's formula for the total heat of saturated steam,

$$H = 1091.7 + 0.305\ (t - 32)\ \text{B.t.u.}$$

is considerably in error. This conclusion is confirmed by computing $H$ above 212°, in terms of $H_{212}$, from the throttling experiments of Grindley, Griessmann and Peake, and the direct specific heat determinations of Knoblauch and Jakob. The result is

$$H = H_{212} + 0.3745\ (t - 212) - 0.000550\ (t - 212)^2$$

The best value of $H_{212}$ seems to be 1150.3 B.t.u. The range of the new formula is from 212° to about 400°. The greatest error in Regnault's formula in this range is 6 B.t.u. at 275°, but if extrapolated to higher temperatures the error in it increases very rapidly.

Below 212° the observations of Dieterici, Smith, Griffiths, Henning and Joly show a thoroughly satisfactory agreement among themselves, and prove that Regnault's formula runs high, the error reaching 18 B.t.u. at 32°. There are corresponding errors on the specific volume values ordinarily used.

### FUEL ECONOMY TESTS

(By C. R. Weymouth, San Francisco, Cal.)

In this paper are presented results of tests at the 15,000-kw. power plant of the Pacific Light and Power Company, Redondo, Cal., having steam engine prime movers, crude oil being used as fuel. The fuel economy is stated for tests on a 5,000-kw. plant unit at various uniform loads, approximating 2,000, 3,000, 4,000 and 5,000-kw.; on a variable railway load; and also for the entire station on a similar variable railway load. The operating and test conditions are fully described.

The results given indicate a remarkable plant economy under all conditions, but the particularly striking feature is the almost uniform fuel economy for the plant unit for all fractional loads from about one-half load up to the maximum load tested. The author believes that the results warrant a careful investigation as to the possibilities in the line of superior plant fuel economy, using the more modern types of steam engines as prime movers.

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WITH the advent of the vacuum sweeper and the air washer together with other devices recently introduced for the mechanical equipment of buildings, the necessity has arisen for giving some one besides the architect supervision of the work as a whole in order to avoid the danger of confusion and interference, as between the various contractors, as well as to enable the different mechanical systems to be installed according to the plans and specifications. An illustration of this necessity may be seen from a study of the plans, published in this issue, of the mechanical plant in the new Importers' and Traders' National Bank building in New York. Here the space at the disposal of the engineers for the elaborate plant determined upon was so limited that it was practically impossible for any one contractor to proceed with his work without constantly consulting the others down to the smaller details, the main difficulty lying in the arrangement of the piping in the sub-basement, so as to secure sufficient head room. This was rendered all the more troublesome by the fact that unusually large and heavy piers had been erected in the sub-basement for the support of the bank's security vault.

The expedient adopted by the architect of this building was to make the heating and ventilating engineers the supervising engineers for the entire mechanical equipment. It thus became a part of their duty to keep constantly in touch with the work as a whole, and to have a competent representative on hand to unravel the engineering difficulties of the various contractors as they arose.

The wisdom of this course was more than justified in the success of the plant, which is easily one of the most compact and at the same time complete of its kind in the country, while the installation as finished is characterized by a degree of neatness which gives but little evidence of the really puzzling problems that were encountered.

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THE recent explosions of gas in New York City's street conduits calls renewed attention to the very serious danger that lurks in such conduits as are not properly ventilated. Most of the conduits, in New York, at least, are in this category, with the notable exception of those of the New York Telephone Company. The escape of illuminating gas from the underground street mains is, apparently, unpreventable in ordinary commercial practice. It

is said that an allowance of at least 50% is made by the gas companies for such leakage. It is evident that electric wire and other conduits, being in close proximity to such mains, are going to receive their full share of the escaping gas, which might easily flow along to the nearest manhole and escape to the outer air. Indeed, in most, if not all, unventilated conduits the manholes are especially perforated to accomplish this purpose. That they do not do so, however, is amply proven by the more or less serious catastrophes that are continually occurring in which men, women, horses or whatever is on or near such manholes are the unwilling victims. These, of course, are due to the fact that some of the component parts of illuminating gas, such as carbon monoxide, are much heavier than air, and in the breaking up of the gas remain in the conduits until some stray electric spark ignites them. If a joke may be had at the expense of those who permit this state of affairs, one is found in the introduction of a bill last winter in the New York State legislature providing that every street manhole be equipped with a safety valve in order to relieve the conduits of any accumulation of gas. The matter, however, is far too serious for such trifling and is fast becoming one that falls distinctly within the province of the ventilating engineer.

In the case of the conduits of the New York Telephone Company, a positive system of ventilation is secured by means of blowers continually operating to force air along the passages, with outlets at the various manholes. This method is simple and effective, and, if universally adopted, would promptly put an end to the dreaded "manhole explosions."

A CURIOUS result of this system of conduit ventilation, which, however, casts no reflection on the system itself, was noted recently when a patron of one of the gas companies complained that he was unable to secure sufficient gas to light his home. An investigation developed the fact that at one of the points of leakage in the gas main, the pressure of air in a nearby telephone conduit overcame the pressure of the gas and the air entering the gas main operated to hold the gas in check so that the product entering the home of the gas company's patron was a dilution of which the principal constituent was air.

---

THE FORTHCOMING meeting of the American Society of Heating and Ventilating Engineers, January 19-21, 1909, should witness some notable additions to the general fund of knowledge on particular subjects connected with heating and ventilating. At no time in the Society's history and, therefore, in the history of the profession, have so many special committees been at work to secure information upon subjects allotted to them. This information, however, must come both from within and from without the ranks of the society itself. It is highly important, therefore, that those most interested in the progress of the art should contribute of their knowledge to the matters that will come up for special discussion, and by this means, which will prove an effective one, spread such knowledge before the heating and ventilating world. Among the special subjects on which data are desired are air washing, fan blast heating, steam and hot water heating and pipe sizes.

# Electric Heating

II

By W. S. Hadaway, Jr.

(Concluded)

### LOW EFFICIENCY IN STEAM-DRIVEN ELECTRIC LIGHT STATIONS

Clearly, the steam-driven electric light station ranks low as a heat distributor for house warming on any considerable scale. And yet notwithstanding the great disparities in the cost of heat energy on a large scale, the uses to which small electric air heaters are put are surprisingly numerous. We are all more or less familiar with the use of gas stoves for room warming, but it has been found by wide experience that the electric air heater for auxiliary room warming, for bath and dressing rooms, for libraries, cabins on yachts and steamships, in mild climates in early morning and evening, etc., serves its purpose with fair economy, and without vitiation of the air and by-products always evident from gas.

It is then on a comparatively small scale and in intermittent service that the electric air heater is useful when power is derived from the steam electric station and when the heat supplied is derived from the electric resistance. It is interesting to note that the relative costs of copper and structural steel differ in nearly the same proportion as the generation costs of electricity and steam. And while we use steel as the frame-body, and copper to round out and embellish the structure, so may the relative value of electricity to steam be regarded in heavy quantitative heating work.

### HEAT STORAGE SYSTEMS

This discussion does not include heat storage systems from hydro-electric installations. Where an equipment is utilized for only 50% to 60% of the day, and water storage is not required, there are opportunities for broadening out electric heating applications by absorbing the energy of the plant in heated water, which may be employed in combination with high-temperature heaters at periods where under other conditions the loads would overlap. It is evident that this method of supplying the low-temperature component of a heating system must be resorted to before electric cooking, which includes hot water in considerable volume, can be generally successful.

### LORD KELVIN'S DEDUCTIONS

While considering the use of electricity in diffused heating on a large scale, we should not overlook the deductions made by Lord Kelvin "On the Economy of the Heating or Cooling of Buildings by Means of Currents of Air" and published in the Glasgow Philosophical Proceedings Vol. III for December, 1852, and followed by mathematical demonstrations in the Cambridge and the Dublin mathematical journal for November, 1853. Quoting from these articles:

In the mathematical investigation it is shown that according to the general principles of the dynamical theory of heat any substance may be heated 30° above the atmospheric temperature by means of a properly contrived machine driven by an agent spending not more than about 1/35 of the energy of the heat thus communicated and that a corresponding machine or the same machine worked backward may be employed to produce cooling effects, requiring about the same expenditure of energy in working it to cool the same substance through a similar range of temperature. When a body is heated by such means about 34/35 of the heat is drawn from surrounding objects and 1/35 is created by the action of the agent; and when a body is cooled by the corresponding process the whole heat abstracted from it, together with a quantity created by the agent, equal

to about 1/35 of this amount, is given out to the surrounding objects.

We have thus introduced refrigeration as well as heating by electricity as agent. In editing his mathematical and physical papers, Lord Kelvin added the following interesting note under the date of June 26, 1881:

The method of heating air described in the article remains unrealized to this day. When Niagara is set to work for the benefit of North America through electric conductors it will no doubt be largely employed for the warming of houses over a considerable part of Canada and the United States. But it is probable that it will also have applications, though less large, in other cold countries to multiply the heat of coal and other fuels, and to utilize wind and water power (with aid of electric accumulators) for warming houses.

Lord Kelvin's deductions on using electricity as agent for warming purposes have been advisedly introduced into this discussion. His conclusions may prove to be wrong until more perfect thermal insulation is developed, but to anyone familiar with thermodynamics and electrical development the possibility of using a positive force to control and direct a less definite form of energy must appeal with singular emphasis.

It may be that the electric furnace using low-grade carbon in high-temperature combustion chambers will give the desired results. Tests indicate that the only obstacle to this latter combination is in making the apparatus "fool-proof." The need for more economical use of fuels and the fact that electricity by resistance heaters is an ideal high temperature component make the development of the low-temperature factor imperative for a complete combination.

### ELECTRICITY DERIVED FROM WATER POWER

When electricity is derived from water power we might expect a far wider availability of energy from heat of resistance for applications requiring heat in large volumes than when electricity is derived from steam power. Careful deductions show that for house warming the cost of a horse power year must not exceed $6.00 in order to compete directly with high grade coal at $5.00 per ton.

Statistics compiled by Professor Geo. F. Swain show that the average cost of the mechanical horse power-year from water power in this counary is about $10.00; to this must be added electrical generation and transmission charges, which make it seemingly impossible to realize a figure for electrical energy delivered that will not be greater than the cost of heat directly from fuel. The compensating advantages in regulation and control, combined with the improved load-factor, especially in combination with thermal storage work, warrants the extensive use of the heat of resistance for house warming at least within restricted areas. In the case of hydraulic plants with large water falls, where the capital charges are relatively low, we may expect many extensive applications of room heating on a successful basis.

In the practical treatment of this question, local conditions will control the breadth of applicability, including in these local conditions cost of electric power, cost of coal delivered, extremes of climate, average humidity, etc.

### WHERE POWER IS DERIVED FROM GAS, OIL OR AIR ENGINES

We have still another source of electrical energy to consider in connection with low-temperature diffused heating, in which power is derived from gas, oil, and air engines. In a lecture before the Royal Institution in April, 1893, on the "Utilization of Energy," Professor Kennedy places the theoretical efficiency of coal gas at 80%. Of this a gas engine, he says, utilizes from 22% to 32%. For diffused heating it is apparently more economical to distribute the gas directly than to attempt to convert its energy into electricity. Attention is further called to the paper by Mr. Williams before the Society of Arts, Boston, Mass., on May 10, 1894, in which comparative costs of coal and various fuel gases are given, and in

which it is shown that the gas equivalent of coal may, under most favorable circumstances, cost eight or ten times as much as coal.

The considerations of its relative values of gas and electricity for heating purposes is a matter that can only be inadequately discussed here, for the problem is a complicated one and demands the most thorough consideration. We must not underrate the facility with which gas may be stored, the economy of rapid and continuous generation, and available heat from combustion and discharges of bi-products, whereas in electric lighting and electric heating every unit of light and heat secured represents an appreciable loss of depreciation of the energy converter.

There are many advantages to be considered on the other side such as localization, immersion of heater in working chamber, as in ovens, sadirons, and waterheaters, freedom from bi-products, etc. In electric heating and cooking for domestic uses the real difficulty is how to provide a hot-water supply economically. The same thing is true in the use of gas, though in a lesser degree. On a broad scale it appears easier to arrange for this on a multipotential heat supply system than on any system using gas.

In his treatise on gas engines, Donkin shows examples of these engines of large size furnishing power at rates less than can be obtained from other prime movers. For high potentials heat distribution from isolated plants this form of energy transmitter is generally available; but it may be seriously questioned whether in isolated plants for domestic use the hot water supply, as accurately provided, can be economically heated, unless of course the combined economies permit the use of individual gas heated water supplies.

### DEVELOPMENT OF ELECTRIC HEATING COMPARED TO THAT OF ELECTRIC MOTOR

It may be safely concluded from the foregoing illustrations that we cannot afford to use electricity for general diffused heating purposes on a large scale. It is proper to point out, however, that practical experience shows that these deductions may lead to unsafe conclusions. There are many striking analogies in heating development to the working out of the electric motor.

If we were to take the case of an engine in a factory and substitute for it an electric motor we would not expect, with our present knowledge of this subject, to effect marked economies. We know that we depend upon the electricity of the small motor to produce results and that the combined load of a number of individual units reduces fixed losses and increases outputs. It is the same in heating. We must consider the individual applications, and the combined results of these will be far different from any considerations controlling a fixed system. One of the reasons contributing to the slow growth of electric heating development is the necessity in many cases of devising apparatus to do work more effectively than could be done by the old methods.

On the other hand, the collective strength of these new methods has given the work a standing in the industrial lines particularly which constitutes an advance in heating development. It has further been shown that results may be obtained which make the cost of operations of secondary importance than is considered solely on basis of thermal values.

### DISTRIBUTION OF BOILER ENERGY

The British thermal unit is the equivalent of 778 foot-pounds of work, and we would obtain as much heat by applying a brake directly to the fly-wheel of the engine or prime mover as we obtain from the heat of electrical resistance, which so far as its results go may be considered as friction. If we use as an average thermal value of a pound of coal 14,500 B. T. U., we can secure 9,400 units in a good steam boiler, or practically 65%.

There are many cases in practice in which the efficiency is exceeded,

but Thurston's figures give 65% as a fair average value. The fuel efficiency of the steam engine rarely exceeds 10%, and the heat incapable of conversion into high-potential energy represents about nine-tenths of the whole, notwithstanding the fact that over six-tenths of the thermal energy of the coal are obtained in useful work in the boiler.

It is therefore to this point we should look for our large volume heat supply, and we find in actual practice many illustrations which show that no great engineering difficulties are encountered in distributing the boiler energy and also that of the exhaust steam from the engine for useful work at a distance. The New York steam company's plants already referred to are distributing energy by live steam for heating and power purposes at about 80 lbs. pressure. The leakage and radiation losses are stated to be estimated at about 15%, yet with this loss the heat energy can be delivered on a successful and economical basis.

The work of Birdsill Holly since 1877 in carrying out central station heat supply is too well known to require explanation. It is important and interesting in connection with our problem since it shows that central stations diffused heat supply is entirely feasible. We are now able to formulate a multipotential heat supply system in which the steam, either live or exhaust, or both, is used for low-temperature work, and electricity from generators in the same station is employed for all work requiring temperatures in excess of that of the steam; that is, from about 250° Fahr. upward. In domestic work the steam heat would be employed for house heating and water heating, for bathing, laundry, and cooking purposes. Electric heat would be used for lamps, ovens, broilers, small stoves, sad-irons and all purposes requiring a high temperature localized heat. And a feature of such a combination not to be overlooked is the facility with which ventilation and heat regulation can be secured, since all the elements are at command to force an abundant supply of heated pure air through the building to be warmed. There are no new or untried features in such a combination; practically all of the elements necessary for the work are already employed though in a somewhat disjointed form so far as complete flexibility of heat supply from one center of distribution is concerned.

Careful study of the question of multipotential heat supply, from both engineering and business standpoints, can hardly fail to give the utmost confidence that results of the greatest value can be obtained along this line. A total fuel efficiency exceeding 35% for both low- and high-temperature heating is certainly attainable, and probably a still higher efficiency may be secured from operations on a large scale. It is in this direction that we must look for the best immediate results of electric heating in domestic life. Electrical engineers realize that the ordinary light and power station is wasteful as a heat generator and distributor, and one of the ways to improve these conditions is to introduce a basis of supply in which the load-factor is a larger percentage of the station capacity and in which low-temperature steam distribution may also be utilized. This study deserves the greatest possible care and while data are occasionally available there is still much to be learned.

### CONDITIONS IN MODERN APARTMENT HOUSES

In the modern apartment house we find it possible to effect a comparatively high distributive heat efficiency. The rooms are heated by low-pressure steam or hot-water radiation and the hot water for laundry, bath-room, and cooking purposes is also supplied.

Electric lighting is available, but low heat efficiency is found in cooking except in cases where gas is available. No one can question the value of gas as a fuel in cooking; we may however take the ground that when a boiler plant is required for room and water heating, and the electric

plant for lighting, the use of gas in cooking is unnecessary and comparatively expensive, for it is a form of heat supply not as effectively localized as electricity and is accompanied by many disagreeable features.

In these houses electricity is already in use instead of alcohol for heating convenience, also for heating sad-irons for laundry work and pressing, and it appears to be a question of time only when electric ovens and other cooking utensils will replace the range or the gas stove on a considerable scale. The apartment house supplied with its own boiler and electric lighting plant, approaches more closely the proper conditions for electric heating than any other mode of domestic life, as all the conditions essential to economical working are already present.

The foregoing deductions have been introduced to indicate broadly wherein the true economical basis of electric heating lies. Like all general considerations they are qualitative rather than quantitative in character. We find in industrial and commercial practice a great number of heat applications, either at high or moderate temperatures, in which close regulation and facility of control are necessary and where electric heating on some scale is applicable.

The introduction of electric lights and motors has brought into use in central stations and isolated plants a vast amount of electrical generating apparatus, so that at the outset our problem is largely one of applying electric heating apparatus on circuits already established, primarily for other purposes. On these circuits we are usually able to show apparatus to do the work required better than it is at present accomplished. First cost and cost of operation are not the sole considerations in any apparatus; in addition to the cost, the collateral advantages derived from its use must be considered.

### TWO METHODS IN FUTURE FOR DISTRIBUTION OF HEAT

We have before us for the future two methods for the distribution of heat, the first, a multipotential heat system in which steam and electricity simultaneously are the means of transmission; secondly, a constant-potential heat system is employed as an agent for diffused heat work in large volume, and the heat of resistance, either directly or with the additional heat of combustion of carbon, is used for high temperature purposes. The first is a combination of well known engineering practices and represents elements in successful use at the present time.

The second method is more difficult, as it includes new methods of applications and untried apparatus. For the present we have to approximate the probable final conditions by using materials at hand so far as they will go with reasonable economy, using every energy to broaden the general conception of the help and convenience arising from central station heat supply.

## The Weather for November

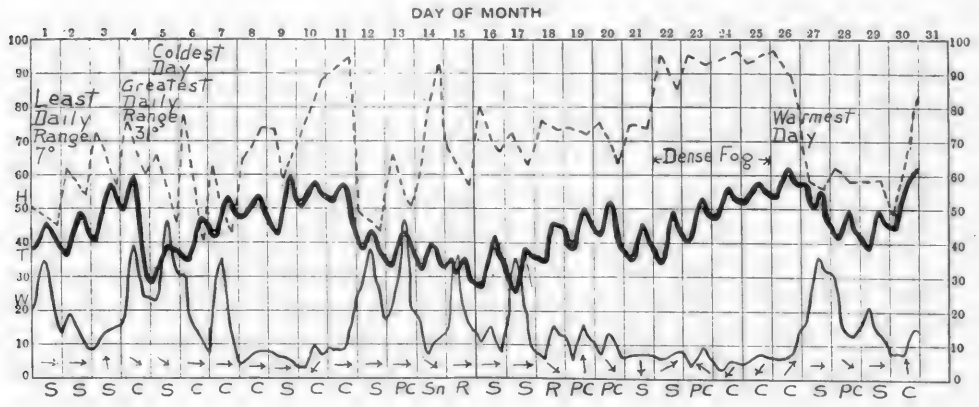
The mild weather characteristic of the month of October, 1908, continued during November, the mean temperatures running in some cases 5° above the mean for 38 years. No records were broken, however, as the mean temperatures for November are apt to vary greatly from year to year, extending over a range of 10° or more. In the East but little rain fell. Of the cities from which we receive weather reports, Pittsburg was the only one that had an appreciable fall of snow during the month, the total snowfall being reported as 3.4 in.

#### NEW YORK

Highest temperature during November, 62°, on the 26th; lowest temperature, 27°, in the 5th; greatest daily range, 31°, on the 4th; least daily range, 7°, on the 1st. Mean temperature for the month, 45°, 1° above the mean of this month for 38 years. Total rainfall during the month, 0.75 in., 2.6 in. less than usual; total snowfall, 0.6 in., all of which fell on the 14th. No snow on ground at the end of the month. Total wind movement, 9,364 miles, mostly from the west; average hourly velocity, 13 miles. There were 13 clear days, 6 partly cloudy and 11 cloudy. Rain fell on only 3 days. There were dense fogs on the 10th, and 22d to 25th, inclusive.

#### BOSTON

Highest temperature, 65°, on the 24th; lowest temperature, 25°, on the 5th; greatest daily range, 34°, on the 4th;


DAY OF MONTH
Coldest Day
Greatest Daily Range 31°
Least Daily Range 7°
Warmest Day
Dense Fog
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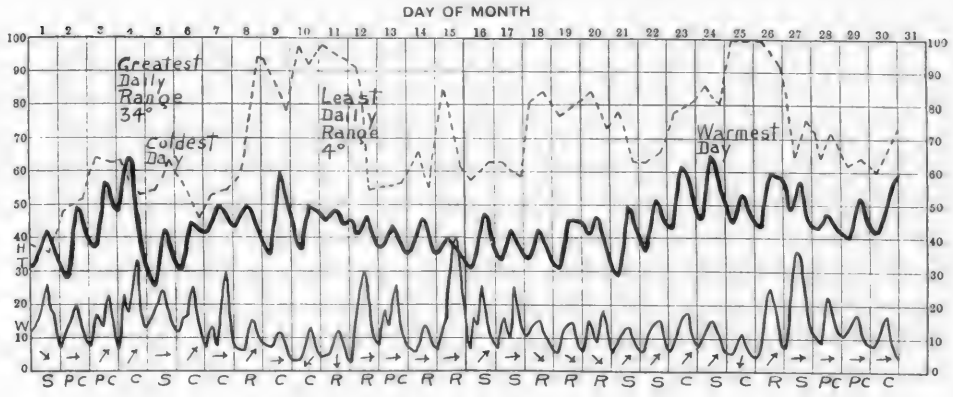
RECORD OF THE WEATHER IN NEW YORK FOR NOVEMBER, 1908


DAY OF MONTH
Greatest Daily Range 34°
Coldest Day
Least Daily Range 4°
Warmest Day
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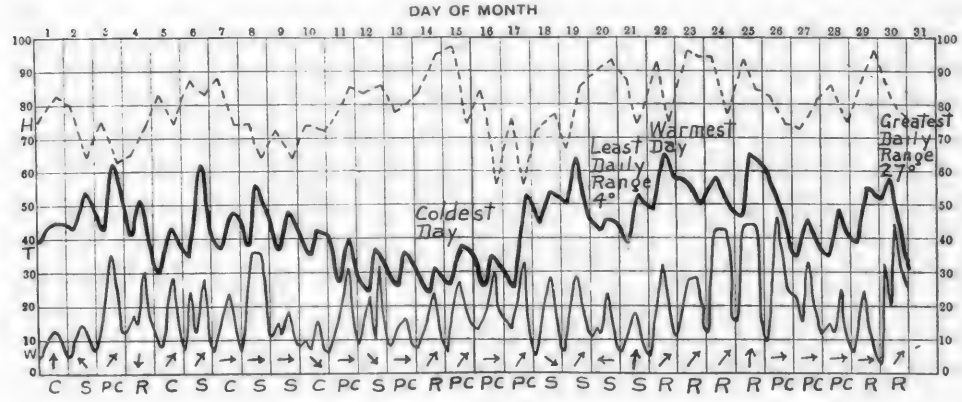
RECORD OF THE WEATHER IN BOSTON FOR NOVEMBER, 1908


DAY OF MONTH
Coldest Day
Least Daily Range 4°
Warmest Day
Greatest Daily Range 27°
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RECORD OF THE WEATHER IN CHICAGO FOR NOVEMBER, 1908

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau

Upper line indicates temperature in degrees Fahr.
Broken line indicates relative humidity in percentage from readings taken at 8 a.m. and 8 p.m.
Lower line indicates velocity of wind in miles per hour.
Arrows fly with prevailing direction of wind.
S—Clear. PC—Partly Cloudy. C—Cloudy. R—Rain. Sn—Snow.

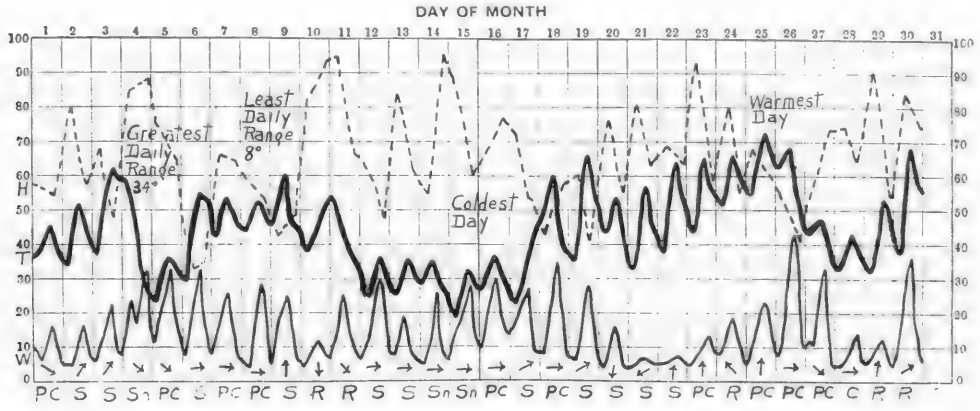
least daily range, 4°, on the 11th. Mean temperature for the month, 44°, 3° above the mean of this month for 38 years. Total rainfall for the month, 0.74 in., over 3 in. less than usual. There were traces of snow at times during the month. Total movement of wind, 8,099 miles, mostly from the west; average hourly velocity, 11.2 miles. Eleven days were clear, 5 partly cloudy and 14 cloudy. Rain fell on 9 days. Fogs were reported on the 8th to 11th, inclusive, and 19th to 26th, inclusive, except the 23d.

CHICAGO

Highest temperature, 66°, on the 22d; lowest temperature, 25°, on the 14th; greatest daily range, 27°, on the 30th; least daily range, 4°, on the 20th. Mean temperature for the month, 44°, 5° above the mean of this month for 38 years. Total rainfall during the month, 2.67 in., approximately normal Total snowfall, 0.9 in. No snow on ground at end of month. Total wind movement, 11,503 miles, mostly from the west; average hourly velocity, 46 miles. There were 9 clear days, 10 partly cloudy and 11 cloudy. Rain fell on 8 days.

PITTSBURG

Highest temperature, 71°, on the 25th; lowest temperature, 19°, on the 15th; greatest daily range, 34°, on the 4th; least daily range, 8°, on the 8th. Mean temperature for the month, 44°, 1° above the mean of this month for 38 years. Total rainfall, 0.69 in., nearly 2 in. less than usual. Total snowfall, 3.4 in. No snow on ground at end of month. Total


DAY OF MONTH
Greatest Daily Range 34°
Least Daily Range 8°
Coldest Day
Warmest Day
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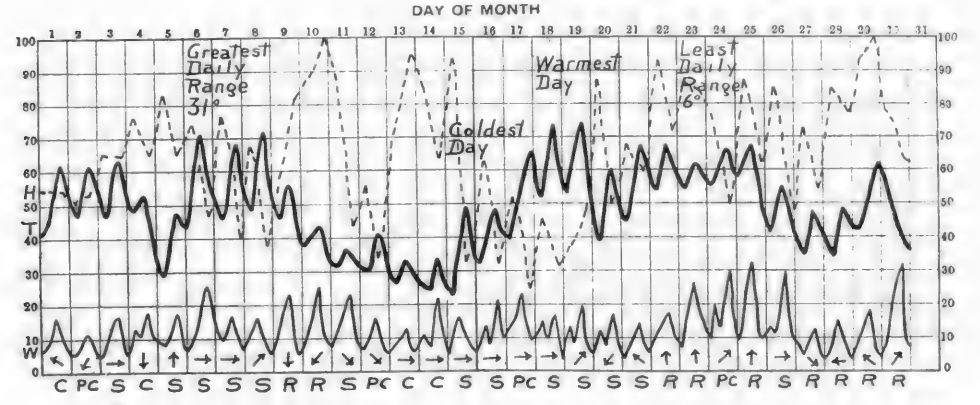
PC S S Sn PC S PC PC S R R S S Sn Sn PC S PC S S S S PC R PC PC PC C R R

RECORD OF THE WEATHER IN PITTSBURG FOR NOVEMBER, 1908


DAY OF MONTH
Greatest Daily Range 31°
Coldest Day
Warmest Day
Least Daily Range 6°
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RECORD OF THE WEATHER IN ST. LOUIS FOR NOVEMBER, 1908

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau

Upper line indicates temperature in degrees Fahr.
Broken line indicates relative humidity in percentage from readings taken at 8 a. m. and 8 p. m.
Lower line indicates velocity of wind in miles per hour.
Arrows fly with prevailing direction of wind.
S—Clear. PC—Partly Cloudy. C—Cloudy. R—Rain. Sn—Snow.

wind movement, 7,764 miles, mostly from the west; average hourly velocity, 10.8 miles. Number of clear days, 11; partly cloudy, 13; and cloudy, 6. Rain fell on 7 days. There were fogs on the 21st and 23d.

ST. LOUIS

Highest temperature, 73°, on the 18th; lowest temperature, 21° on the 15th; greatest daily range, 31°, on the 6th; least daily range, 6°, on the 23d. Mean temperature for this month, 49°, 4° above the mean of this month for 36 years. Total rainfall during the month, 2.83 in., corresponding to normal. Traces of snow were observed during the month. Total wind movement, 7,453 miles, mostly from the west; average hourly velocity, 10.4 miles. Thirteen days were clear, 6 partly cloudy and 11 cloudy. Rain fell on 9 days.

## Current Heating and Ventilating Literature

*Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the articles mentioned may be obtained from* THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

COOLING RESIDENCES

The Use of Ice for Cooling Dwelling Places. Karl Heimpel, Vienna, Austria. Abstract of paper read at the International Congress of Refrigerating Industries. Cld Stor & Ice Tr Jl—Oct., '08. 400 w. 40c.

FAN SYSTEM FOR SHOPS

Shop Heating and Ventilation. Describes a fan system in a large boiler shop. Ir Age—Oct. 22, '08. 5 figs. 1300 w. 20c.

HEATING AND VENTILATING SHIPS

The Heating and Ventilating of Ships. Sydney F. Walker. Describes the heating by electricity of a large passenger steamer. Int Mar Engg—Nov., '08. 3700 w. 40c.

PIPES

Cast-Iron Pipe Standard Specifications. Two reports issued by the British Engineering Standard Committees, regarding the standard dimensions, weights, etc., of cast-iron pipes. Ills. 1400 w. Ir & Coal Trds Rev—Oct. 9, 1908. 20c.

WATER HAMMER IN STEAM PIPES

Gives examples of the fracture of pipes and valves taken from Mr. Longridge's report for 1907 to the British Engine and Electrical Insurance Co., Ltd. Engr—Oct. 23, '08. 14 figs. 1700 w. 40c.

SHIP VENTILATION

Ventilation and Sanitation. A. E. Battle. Read at Olympia before the Inst. of Marine Engrs. Discusses ventilation, heating and berthing arrangements on board ship. 4000 w. Marine Rev—Oct. 15, 1908. 20c.

STATION HEATING

Hot Water Heating Arrangements for Passenger Stations. Abstract of a paper by J. P. Canty read before the New England Maintenance of Way Assn.; also discussion. 4200 w. Ry & Engng Rev—Oct. 10, 1908. 20c.

VENTILATION

Systems of Mechanical Ventilation and Refrigeration for the Carnegie Safe Deposit Co.'s Vaults. J. Byers Holbrook. Illustrated description of the system of ventilation designed to insure a constant supply of fresh cool air and removal of vitiated air. 2200 w. Am Archt—Oct. 14, 1908. 20c.

Methods for Testing the Efficiency of Ventilation. Ellen H. Richards, E. Marion Wale, Royce W. Gilbert, Carl E. Hanson, James M. Talbot. Tech Quart—Sept., '08. 3 figs. 3500. 80c.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

## Data Wanted on Steam Heating for Small Buildings

The committee on steam heating data for small buildings, composed of J. J. Blackmore, 118 Fifth avenue, New York, chairman; James A. Donnelly and George B. England, has asked for information in the way of answers to the following questions. The information secured will be incorporated in a report to be presented at the society's annual meeting, January 19-21, 1909:

QUESTIONS FOR GATHERING DATA ON SMALL STEAM BOILERS IN PLANTS OF FROM 300 TO 1,000 SQ. FT.

1. Do you take the manufacturers' rating as a basis when figuring the size of boiler required?

2. What percentage do you figure in addition to the radiation for main flow and return pipes, risers, etc.?

3. What additional percentage do you figure as a measure of safety?

4. Do you consider the grate surface as a factor in sizing up the boiler?

5. If you consider the grate surface, how much do you allow for each 100 ft. of direct radiation?

6. Do you consider the shape of the grate a factor?

7. Do you examine the chimney of a building to determine the draft you will get?

8. Do you figure on any rate of combustion per square foot of grate per hour?

9. What steam pressure do you estimate on for your calculations?

10. Give method of obtaining necessary radiation.

QUESTIONS ON THE SUBJECT OF RADIATION

11. Give rule for wall exposure.

12. Give rule for glass exposure.

13. Give rule for ceiling exposure.

14. Give allowance for north, east and west exposure.

15. Give rule for direct radiation.

16. Give rule for indirect radiation.

17. Give rule for direct-indirect radiation (or semi-direct radiation).

18. Give surface allowed for change of air (ventilation).

19. What height of radiator is the most effective?

20. What number of sections is the most effective?

21. State best position in room for radiator.

22. In connection to riser, which is best for the long run, the steam or return?

23. Are pipe surfaces more efficient than cast iron?

24. How much more surface is needed on ceiling than at the floor?

25. What is the best form of connecting nipple?

26. Give rule or formulæ for test when weather is warmer than temperature mentioned in the contract.

QUESTIONS FOR THE COLLECTION OF DATA ON SIZE OF STEAM AND RETURN MAINS ON SMALL STEAM HEATING PLANTS

The following questions refer to the size of steam and return pipes in small steam heating plants, and those not having a run to exceed 100 ft. from the source of supply.

27. What is the maximum amount of direct radiation which you consider permissible where the steam and condensation in the mains flow in the same direction?

28. What is the maximum amount of direct radiation where the steam and condensation flow in opposite directions in horizontal pipes?

29. What is the maximum amount of direct radiation in (a) up-feed steam risers; (b) down-feed steam risers?

30. What is the maximum amount of direct radiation which is permissible to connect to return risers?

31. The maximum amount on horizontal dry return mains?

32. The maximum amount on horizontal wet return mains?

33. What are the amounts of radiation which you consider the maximum for radiator connections upon one and two-pipe systems?

## Nominations of Officers for 1909

The following nominations in the American Society of Heating and Ventilating Engineers have been made by the nominating committee. The vote will be by ballot and will be announced at the annual meeting of the society.

For president, William G. Snow, Boston, and James D. Hoffman, Lafayette, Ind.

For first vice-president, August Kehm, Chicago, and Charles R. Bishop, Lockport, N. Y.

For second vice-president, Burt S. Harrison, New York, and Edmund S. Capron, Chicago.

For secretary, William M. Mackay, New York, and Herbert A. Joslin, New York.

For treasurer, U. G. Scollay, Brooklyn, and L. B. Sherman, New York.

For directors (five to be chosen), James Mackay, Chicago; B. F. Stangland, New York; Samuel R. Lewis, Chicago; R. C. Carpenter, Ithaca, N. Y.; Percival H. Seward, New York; B. Harold Carpenter, Wilkes-Barre, Pa.; John R. Allen, Ann Arbor, Mich.; Cesar Teran, New York; John F. Hale, Chicago, and John F. Brennan, Milwaukee.

SPECIAL RAILROAD RATES TO NEW YORK IN JANUARY

Special rates of a fare and a half for visitors to New York City during January have been obtained from several of the passenger associations by the Merchants' Association of New York. As the annual meeting of the heating engineers' society takes place in January, the out-of-town members who intend to be present can take advantage of this concession, which will prove, in many cases, a considerable factor in connection with the expenses of the trip.

## Books Received

**Le Chauffage des Habitations** is the title of a new French book on heating, written by Gustave Debesson, who is a member of the American Society of Heating and Ventilating Engineers and known to American heating engineers, having read a paper before the American society a few years ago on French systems of heating. The new book is an exhaustive work containing 653 pages, illustrated with 711 views of various types of heating apparatus and designs. American heating devices and methods of heating are given special prominence. The book is printed in large type and the matter is attractively presented. The binding is limp, permitting the book to lie open at any given page. Size, 6½ in. x 10 in. Paris: H. Dumond et E. Pinat, 49 Quai des Grand Augustins. Price, 25 francs, or $5.00.

# TRADE AND MISCELLANEOUS NOTES

### Coming Events

**January** 19-21, 1909. Annual meeting of The American Society of Heating and Ventilating Engineers.

### Deaths

**George M. Davis,** of the G. M. Davis Regulator Co., Chicago, died at Morrill, Texas, Nov. 14, of paralysis. He was 63 years old. A widow and two sons survive him.

### Miscellaneous Notes

**Winnipeg, Man.**—W. E. Skinner has applied to the board of works for a franchise to lay steam heating pipes in the city streets for the purpose of heating buildings. Before granting the franchise, the council has asked Mr. Skinner to furnish an estimate of the cost of heating by his system half a dozen of the large buildings of the city, selected by the committee.

**Michigan Power Co.,** Lansing, Mich., has begun furnishing steam heat from its new plant at that place.

**York, Pa.**—Steam from the mains of the York Light & Power Co. was turned on for the first time last month, connecting with the court house, opera house, Elks' building and a number of business blocks.

**Columbia Heating Co.,** Belleville, Ill., has been purchased by Charles Frederickson, who will manufacture hot water heaters similar to those made by the Columbia Heater Co. One of the buildings, 36x150 ft., was saved from destruction in the fire several months ago, and the walls of the other building, 36x200 ft., are practically intact.

**Springfield, O.**—The Springfield Light, Heat & Power Company, which was recently incorporated, to take over the Peoples' Light, Heat & Power Company and the Home Heating & Lighting Company, of Springfield, is now in full control of the plants. The officers of the new company are: John L. Zimmerman, of Springfield, president; J. D. Price, of Columbus, vice-president; John K. Henry, of Columbus, secretary. Messrs. Sharp, of Columbus, and Hagen, Kay and Lind-

ENGINEERS AND STEAMFITTERS REQUIRE GOOD TOOLS

The GENUINE ARMSTRONG Stocks and Dies are

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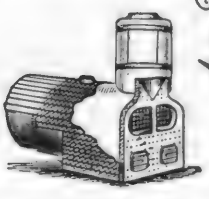

ESTIMATES FURNISHED AND CONTRACTS EXECUTED.

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say, of Springfield, and the officers are the board of directors.

**B. J. D. Blackmore** has been appointed consulting engineer of the Downey & Kruse Co., Milwaukee, Wis.

**Arthur C. Walworth,** of the Walworth Mfg. Co., Boston, Mass., gave a dinner November 18 at the Exchange Club, in that city, in celebration of the 100th anniversary of his father, James J. Walworth, one of the first men to engage in the pipe and steam fitting business in this country.

**Rochester Railway & Light Co.,** Rochester, N. Y., will use the surplus electrical energy developed at its plant at the lower falls to heat a 100 H. P. steam boiler used during the winter for heating purposes. Coal has been used heretofore, but it has been found that for some time every day an excess of energy is developed in its water turbines which may thus be utilized without additional cost.

**Department of Commerce and Labor,** in a published report, shows the plumber's average weekly wages in the United States to be $21.70, as against $9.93 in Great Britain, $7.35 in France, $5.62 in Germany and $3.84 in Belgium.

**Building operations for October** show a total in 36 cities of 9,792 buildings, costing $43,074,775, against the figures for the corresponding period in 1907 of 9,157 buildings, costing $31,736,855. The largest gains were made in New York, Philadelphia and Denver. The figures for New York are $15,341,970 in 1908, and $7,210,025 in 1907.

## Manufacturers' Notes

**United States Heater Co.,** Detroit, Mich., announces the appointment of M. G. Pierson as the company's general sales manager. Mr. Pierson was formerly assistant secretary of the company. Edwin R. Stoughton has been appointed assistant general sales manager.

**C. J. Tagliabue Mfg. Co.,** New York, manufacturer of thermometers, is planning to build a factory at Cleveland, Oswego County, N. Y.

**Crane Co.,** Chicago, has closed negotiations with the Best Mfg. Co., of Pittsburg, whereby the interests of the two firms are consolidated. The Pittsburg house will be known as the Crane-Best Company of Pittsburg, and a new plant built at Oakland. The Crane-Best Co. will act as the Eastern branch of Crane Co., of Chicago.

**Thomas F. Cushing Co.,** New York, dealers in steam fitting supplies, has purchased the Harlem branch of the John Simmons Co., at 451-455 West 125th street, New York, and has moved into its new quarters. Howard W. Walton, manager of the Harlem branch for the John Simmons Co., has been elected secretary of the Thomas F. Cushing Co.

**Standard Gauge Mfg. Co.,** Foxboro, Mass., has moved into the plant formerly occupied by the Schaeffer & Budenberg Co., which has returned to its former home in Brooklyn. The plant at Foxboro was sold to the Industrial Instrument Co., recently organized by Bennett B. Bristol, formerly of the Bristol Co., Waterbury, Conn. As the same interests own both the Industrial Instrument and Standard Gauge Companies, the Foxboro plant has been deeded to the latter. The plant includes two main buildings, 60x210 ft. each, and a foundry, 60x150 ft. The present officers of the Standard Gauge Mfg. Co. are: President, Watson E. Goodyear, of Naugatuck, Conn.; treasurer, Bennett B. Bristol; secretary and general manager, A. F. Mundy.

**Andrews Heating Co.,** Minneapolis, Minn., is building a large manufacturing plant in Minneapolis, which it expects to occupy by March 1. With the land, building and machinery, the total investment will be about $100,000. The company's tract is about 10 acres in extent, which provides 350 ft. of Northern Pacific trackage. The building will occupy the entire frontage of 100 ft. A spur track will be built into the shop. The main building, of concrete and steel, will be three stories high at each end and will have a one-story 40-ft. boiler shop in the center. A separate structure, 40x90 ft., will be occupied as an office. The plant will be equipped with new machinery and will employ 100 men. The present plant of the company in Minneapolis will be abandoned when the new building is completed.

## New Incorporations

**Twentieth Century Pipe Wrench Co.,** Lancaster, O. Capital stock, $25,000. Incorporators: G. M. Gealy, James Henderson, F. P. Barr, J. C. Dallow and L. G. Sillbaugh.

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OR BOILER DRY-PIPE
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POTTER SEPARATOR CO., Newburgh, N.Y. N.Y. OFFICE: 39 Cortlandt St.

**People's Co-Operative Plumbing Co.,** New Orleans, La. Capital stock, $200,000. President, Daniel L. Ryan; vice-president, R. J. Pelletier; secretary-treasurer, R. E. Pelletier, Jr.

**W. S. Clearwater Plumbing & Heating Co.,** Passaic, N. J. Capital stock, $10,000. Incorporators: Winfield S. Clearwater, Harry Offord and William Gray.

**Stancell & Riddle Co.,** Louisville, Ky.; capital, $2,000; to conduct a heating and plumbing business.

**Central Heating Co.,** Huron, S. D. Capital stock, $300,000.

**Akron Heater Co.,** Akron, O.; capital, $5,000; to manufacture heaters, radiators and stoves. William C. Scott, Akron, is the principal of the company.

**Peerless Heater Co.,** Pittsburg, Pa.; capital, $5,000; to manufacture heaters of various kinds. Incorporators: C. Howard Hook, president; Karl E. Nelson and M. C. Manion, all of this city. Mr. Hook was formerly interested in the Reliance Heater & Supply Co.

**Davis Steam Generator Co.,** Toledo, O.; capital, $100,000; to manufacture steam heating boilers. Incorporators: Samuel S. Davis, Walker Morrison, L. J. Pugh, A. H. Razor and John M. Ormond.

**Hiawatha Heater Mfg. Co.,** Norway, Me. Capital stock, $50,000. Incorporators: F. W. Engler and W. W. Phillips, Winthrop, Me.; and M. L. Kimball, of Norway.

**Magnesia Co.,** New York. Capital, $2,000,000. Directors: Gustave B. Janson and Stanton Kohler, Madison avenue, and H. W. Corbett, 122 East Twenty-first street, New York.

**Automatic Tap-Valve Co.,** Buffalo, N. Y. Capital stock, $100,000. Directors: Charles F. Terney, August W. Bramm and E. W. Terney, all of Buffalo.

**Novelty Plumbing Co.,** New Orleans, La. Capital stock, $30,000. Incorporators: A. M. Rennyson, I. B. Rennyson and John J. Reilly.

**Brownrigg & Stevenson Co.,** New York; capital, $10,000; to deal in steam supplies. Incorporators: C. Maxwell Stevenson, Leo W. Brownrigg and Robert E. Samuels, 29 Broadway, New York.

**Boynton Furnace Co.,** New York, has been incorporated with a capital stock of $400,000. Incorporators: Wells S. Dickinson, Charles M. Benedict and Henry H. Abbott.

**Kansas City Pressed Metal Radiator Co.,** Kansas City, Mo.; capital, $75,000; to manufacture hot water radiators. Incorporators: James Muir, Paul F. Covington, Hall C. Brent, T. H. Walker and W. Z. Flanery.

**Calorific Boiler Co., New York;** capital, $100,000; to take over the patterns and good will of the Calorific Heater Co. and the Argand Boiler Co., formerly owned by the Fred D. Johnson Co., and later by the Colonial Foundry Co., South Norwalk, Conn. The company will build a new plant and will have offices in New York. President, James Walp, Allentown, Pa.; secretary and treasurer, Thos. F. Leman, 203 St. Nicholas avenue, New York.

### Business Changes

**Fitzmeier & Co.,** 126 West Peach street, Connellsville, Pa., has taken over the business of the Yough Plumbing Co., at that place.

### Business Troubles

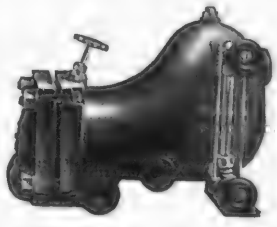
**Westchester Heating & Engineering Co.,** Yonkers, N. Y., has failed. A list of 47 creditors has been filed, but the assets and liabilities were not given.

### Business Chances

**St. Joseph, Mo.**—The Board of Managers of the State Hospital, No. 2, will ask that $100,000 be appropriated by the legislature this winter for the construction of a new heating plant for the hospital buildings.


**McDaniel Improved Steam Trap**

**WILL DO THE WORK**



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**Washington, D. C.**—Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, for the following named work:

Until December 29, 1908, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the U. S. Post-office at Alton, Ill.

Until January 6, 1909, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the U. S. Post-office at Paris, Ill.

### New Firms

**Iroquois Engineering Co.,** 1211 Fisher building, Chicago, is a new firm which will act as manufacturers' agent for the Fitzgibbons Boiler Co., of Oswego, N. Y. W. L. Bronaugh, formerly in charge of the Chicago branch of the B. F. Sturtevant Co., is the manager of the new concern.

### Contracts Awarded

**Biggs Heating Co.,** Washington, D. C., heating system for Calhoun building.

**Henshaw, Bulkley & Co.,** San Francisco, Cal., heating and ventilating Phelan building, for $11,300.

**L. L. Lord Plumbing Co.,** Meadville, Pa., steam heating and plumbing new Crawford County building for the United States government. The building will cost $100,000.

**R. T. Ford & Co.,** Rochester, N. Y., steam heating, ventilating and plumbing the New York State educational building at a contract price of over $600,000. Over 300,000 sq. ft. of direct, indirect and direct-indirect radiation will be installed. The building itself will cost $4,500,000.

**W. A. Sherman,** Troy, N. Y., heating Public School No. 12, for $7,300.

**Fuller & Warren Co.,** Troy, N. Y., heating Public School No. 13, for $4,590.

**Hess, Ran & Co.,** Mitchell, S. D., heating and plumbing new high school building, for $15,787.50.

**Craighead Plumbing & Electric Co.,** Richmond, Ind., heating, plumbing and electric wiring in new residence of Mrs. J. M. Garr, for $5,000.

**Crook-Kries Co.,** Baltimore, Md., heating and ventilating new St. Rose Industrial School in Washington, D. C., for $17,000.

**King Plumbing Co.,** Keokuk, Ia., heating new school building at that place, for $5,486.

**McCawley Plumbing Co.,** Des Moines, Ia., heating new church of Christ, Scientist, at that place, for $7,390.

**C. F. Ruch Plumbing & Heating Co.,** St. Joseph, Mo., heating addition to the McKinley school at that place, for $5,100.

**Downey & Kruse Co.,** Milwaukee, Wis., heating Auditorium building in that city, for $6,300. The installation, it is expected, will be finished by January 1, 1909.

**W. A. Bowers Heating Co.,** Milwaukee, Wis., Central hot water heating system for 44 buildings at the western branch, National Home of Disabled Volunteer Soldiers, at Fort Leavenworth, Kan.

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**John G. Young,** Buffalo, N. Y., central steam heating plant in the new Church of the Assumption, in Buffalo.

**American Blower Co.,** Detroit, Mich., contract for heating the buildings of the Anglo-Newfoundland Development Co., Grand Falls, Newfoundland, paper manufacturers. Four sets of apparatus will be used, having a combined capacity of 267,000 cu. ft. of air per minute. Vento cast-iron indirect radiation will be used, and will amount to 13,827 sq. ft.

**H. T. Siebert,** Avon, N. Y., heating and plumbing St. Agnes' School, for $3,000.

**George Parker Co.,** Omaha, Neb., heating and plumbing new detention home in that city, for $4,643.

**Lewis & Kitchen,** Chicago, heating and ventilating new public school at Atlanta, Ill., for $6,208.

**M. J. Gibbons Co.,** Dayton, O., new heating system for county infirmary, to cost $8,265. The original contract with the Gibbons Co. was contested in the courts and has now been relet.

**M. B. Sanders Plumbing Co.,** Little Rock, Ark., heating and plumbing addition to government building for $7,000.

**Back Numbers Wanted of The Heating and Ventilating Magazine**

Fifty cents apiece will be paid by the undersigned for the following-named back numbers of THE HEATING AND VENTILATING MAGAZINE:

February, 1905.
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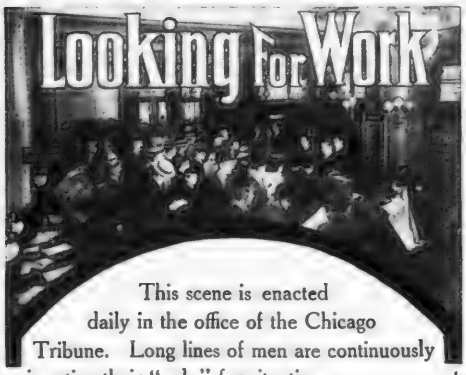


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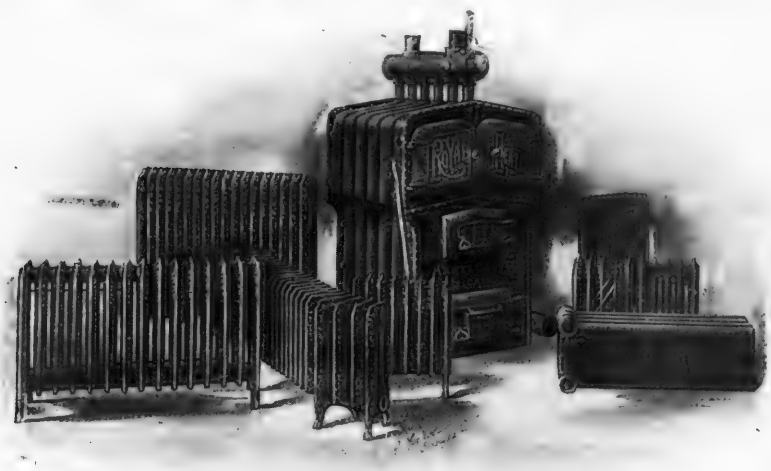

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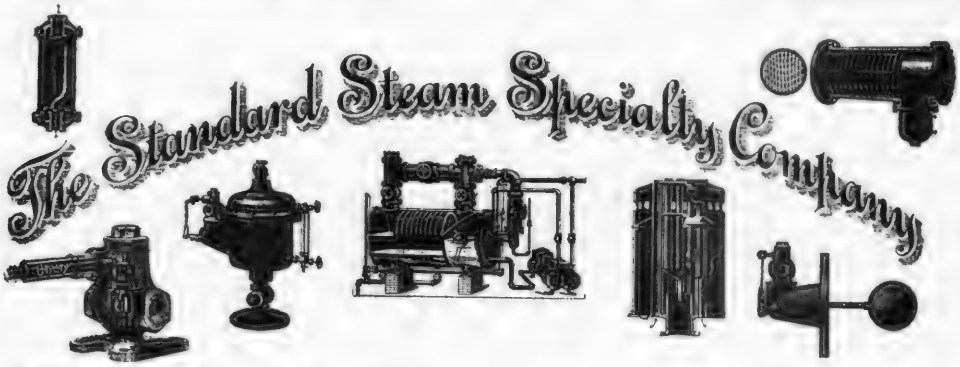


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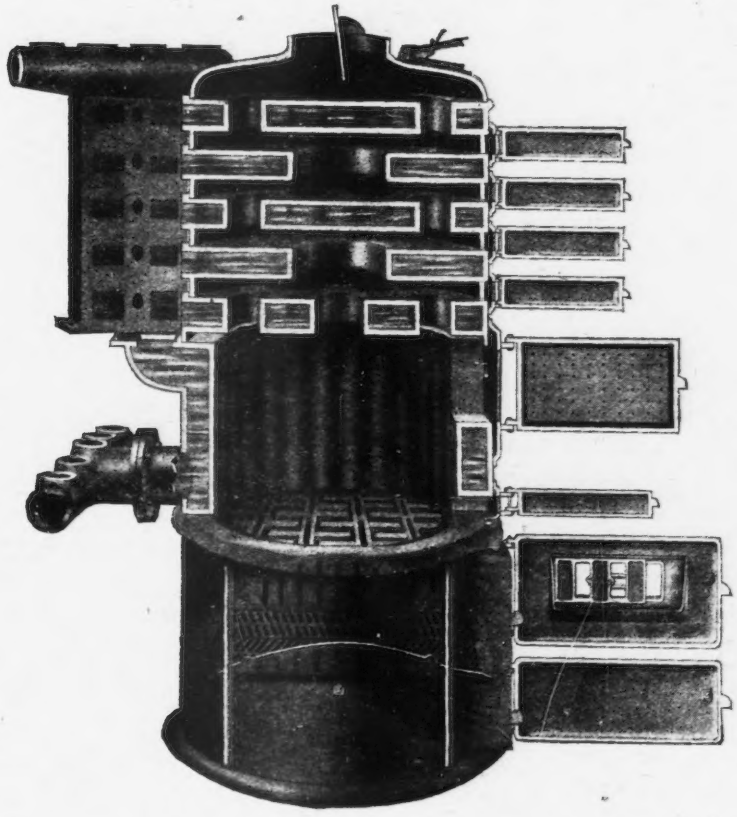

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